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Amateur Radio

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MARCH 1999

CQ

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man Leifer, W4FLA, Boonton, NJ

AMATEUR'S JOURNAL

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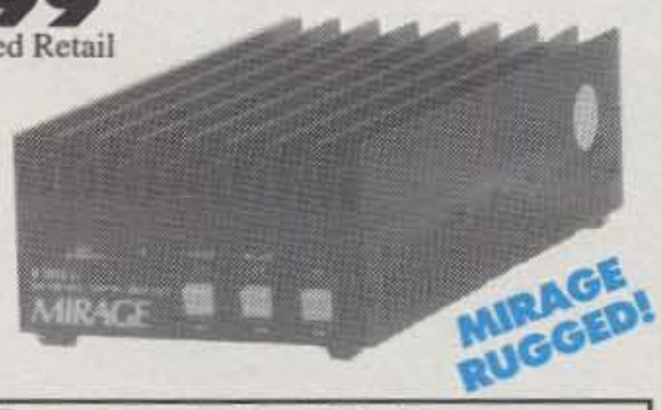
B-5016-G
$299
Suggested Retail



Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1B, $45, Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail

Power Curve -- typical B-310-G output power							
Watts Out	25	50	75	95	100	100+	100+
Watts In	¼	½	1	2	4	6	8

- *100 Watts out with all handhelds up to 8 watts*
- *All modes: FM, SSB, CW*
- *Great for ICOM IC-706*
- *15 dB low noise GaAsFET preamp*
- *Reverse polarity protection/SWR Protection*
- *FREE mobile bracket* • *Auto T/R switch*
- *FREE handheld BNC to B-310-G cable*
- *Ultra-compact 4³/₄x1³/₄x7³/₄ inches, 2½ pounds*
- *One year MIRAGE warranty*

***Boost** your 2 Meter handheld to 100 Watts!* Ultra-compact all mode B-310-G amp is perfect for *all* handhelds up to 8 watts and multimode SSB/CW /FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- *35 Watts Output on 2 Meters*
- *All modes: FM, SSB, CW*
- *18 dB GaAsFET preamp*
- *Reverse polarity protection*
- *Includes mobile bracket*
- *Auto RF sense T/R switch*
- *Custom heatsink, runs cool*
- *Works with handhelds up to 8 watts*
- *One year MIRAGE warranty*

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

- *45 Watts on 2 Meters/35W on 440 MHz*
- *Auto Band Selection* • *Auto T/R switch*
- *Full Duplex Operation* • *5x1³/₄x5 inches*
- *FREE mobile bracket* • *"On Air" LEDs*
- *Single Connector for dual band radios and antennas*
- *Reverse polarity protection*
- *Works with all FM handhelds to 7 watts*
- *One year MIRAGE warranty*

Add this Mirage *dual band* amp and boost your handheld to a *powerful* mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz! **Mirage's** exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation.* (Requires compatible HT).

6 Meter Amplifier

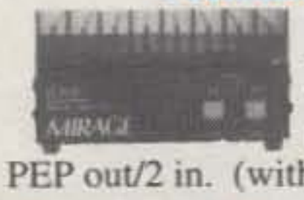
FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 watts out for 10 in. For 1 to 15 watt transceivers.

70cm Amplifiers (420-450 MHz)

D-3010-N, $365, -- 100 W out/30 in. For 5 to 45 watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps



Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 watts PEP out / 10 in. **D-100-ATVN, $414**, 82 watts PEP out/2 in. (without sync compression).

Remote Control Head for Amps

RC-1, $45, remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

High gain *ultra low noise* GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 Watts. **Choose** In-*Shack* model or *Mast-Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 watts out for 2 to 50 watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial amps for 150 - 174, 450-470 MHz and VHF marine bands, 70 -130 watts out.

Accurate SWR/Wattmeters

Read SWR directly andForward/ Reverse, Peak/Average power. Remote Coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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CIRCLE 135 ON READER SERVICE CARD

CQ Amateur Radio

MARCH 1999 VOL. 55, NO. 3

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ON THE COVER: Here we see Sherman Leifer, W4FLA, at the rig at his Boonton Township, New Jersey QTH. The rig, in this case, happens to be one of the new Kachina computer-integrated HF radios which Sherman uses to good advantage mainly on 20 meter SSB. Outside, atop his 91 ft. crank-up US Tower, reside a monster 7-element 20 meter Yagi on a 60 ft. boom, and a 15 and 17 meter 9-element duobander on a mere 36 ft. boom. Sherman is the proud owner of a full-service computer business and seems also to have an afinity for fast, interesting cars such as Corvettes. (Photo by Larry Mulvehill, WB2ZPI)

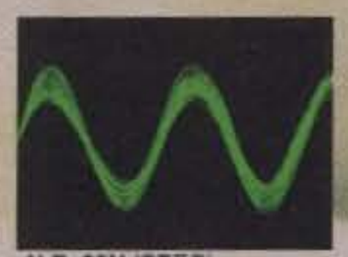
Say You Saw It In CQ

A Breath of DSP Fresh Air

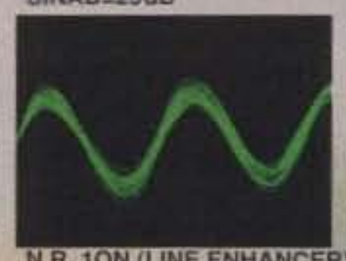
Kenwood was the first to offer DSP in the legendary TS-950SDX. Now you can enjoy the affordable benefits of Advanced Digital Signal Processing with the all new TS-570D/S(G)

Let the fresh air and sun shine in on your new HF experience.

N.R. OFF SINAD=6dB



N.R. 20N (SPEC)
SINAD=25dB



N.R. 1ON (LINE ENHANCER)
SINAD=18dB

Advanced Technology Upgrade

TS-570D(G) HF TRANSCEIVER/TS-570S(G) HF + 6M TRANSCEIVER

Kenwood has not been standing still since the introduction of the TS-570D/S HF Transceiver last year. Now you can command even more of Kenwood's advanced DSP technology with the G model.

The **DSP** filters and extracts signals with digital technology that is unmatchable with standard analog circuits. It provides **CD-class transmit and receive audio quality** that can be shaped to your needs, and two powerful noise reduction systems: **Line Enhancer Method** for SSB/AM modes, and **Speech Processing by Auto Correlation** (SPAC) for CW mode. DSP also enables the **CW-Auto Tune** feature that automatically zero-beats CW signals.

The **Extensive Memory Functions** provide a bank of 100 memory positions split into 90 standard channels for general operation and 10 for programmable VFO, programmable scan and long-term memory. Memory contents can be scrolled, copied or locked out. In addition there are **5 quick memories** for storing frequencies and modes on the fly, perfect for the busy DX contester.

The powerful **Menu System** incorporates **46 menu features** and an **on-line guide** for instant reference. The **large amber backlit LCD display** provides 4 light levels for clear readability under any lighting conditions.

The TS-570D/S has no shortcomings in the construction and performance area. The **continuous-duty 100 watt transmitter** incorporates a large heavy-duty heat sink with integrated cooling fan for non-stop operation even under extreme environmental conditions. The **wide-band receiver** is rock-stable from 500 kHz through 30 MHz with **dual pre-amps** and **dual bandpass filters** for exceptional selectivity and sensitivity.

With the features and performance of a high-end radio integrated into an affordable mobile-size package, the TS-570D/S is the perfect choice for the field or to build a full station around at home.

***FREE* operating manual via FTP site**
ftp://ftp.kenwood.net

- Beat cancel
- 2 position antenna switch
- CW auto tune adjust (a world's first)
- Channel scan, program band scan, memory scan with channel lock-out and group channel scan, all with TO (time operated) or CO (carrier operated) resume modes
- Compact 10-5/8 inch by 3-3/4 inch front panel size for any travel or installation requirement
- Preset auto antenna tuner with 18 sub-bands
- Variable electronic keyer (0 and 100 wpm)
- Packet and FSK features
- RCP-2 software for PC-based display and memory configurations available via the Internet
- Full functionality on 6M (TS-570S) including DSP, 100 watts output and preset Auto Antenna Tuner
- QRP output adjustable from 5 to 100 watts

TS-570D/S (G) new features

■ TX sound quality monitor with 9-step monitor volume for absolute control over voice quality ■ NR1 (SSB) is operator controllable in 9-step increments, or automatically tracks input signal strength ■ New CW DSP Filters (80 Hz, 150 Hz and 500 Hz) give you a total of 11 user-selectable filters ■ NR1 and NR2 settings can now re-configure automatically when changing mode groups (SSB/AM/FM to CW/FSK) ■ Manual weight feature (with built-in electronic keyer) for adjusting the relative length of dots and dashes in 16 steps between 1:2.5 and 1:4.0 ■ Equalize receive signals, and use different settings for both TX and RX ■ "One-touch" DSP filter wide mode allows 'resurfacing' to check the band conditions when operating in narrow mode ■ Dual selectable Beat Cancel (BC) works against intermittent beat interference (except in CW mode) ■ CW auto tune mode links only with the RIT frequency without changing the transmit frequency.

Advance Technology Upgrade is available in new production models and for pre-existing TS-570D/S; contact you dealer for details.

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ZERO BIAS

AN EDITORIAL

When I wrote Zero Bias for the February issue, I wondered how long it would take. It didn't take too long. The other day, when I arrived home from work, I saw the blinking light of my telephone answering machine, indicating a message. The message was from a fellow amateur who was relaying/delivering/passing on to whoever would listen to it the fact that "radiograms" are alive and well. The origin of the message was Maine. I'm sorry, but I didn't get the call of the helpful amateur who facilitated the traffic. Thank you, though, for your efforts.

I guess a phone call from Maine to Long Island is out of the question, but in principle the "radiogram" system works, as I did get the message. While the experience didn't put me in a state of reverie, I began to think about what I would write about this month. As I write this, nothing has been decided about the proposed licensing restructuring, so unless something does happen before we go to press, that subject for the moment is moot. I do want to thank the few amateurs out there who wrote to me to castigate me for fomenting and orchestrating the whole thing. I didn't know I had that kind of power or that I was Machiavellian. Sorry to burst the bubble, but I learned about the same way the rest of you did—by reading about it.

There are two things I wanted to cover this month. The first also relates to something I wrote last month. I apparently hit a sore spot when I facetiously talked about the typical amateur version of shareware (small s) whereby one person buys the software and then numerous copies are made and passed around. I'm not about to give a lecture on intellectual piracy or theft of services, but I would prompt people to think about all the great software that people work hard to develop, manufacture, advertise, and sell, hopefully to make a profit. Think of all the names of people and companies supplying us with terrific software who are no longer on the scene, and think about why they're not there anymore and who else will fade away this year. Even free has an enormous price.

We as a group seem to have an anathema to anything costing money with regard to amateur radio. It's usually the first thing that people rant at when change happens. Somehow it's all some plot to make money. Well, while at times I may wish it was true, historically it hasn't worked out that way. Change happens all the time, and with regard to amateur radio, money has had very little to do with it. The only thing we as amateurs are rich in is imagination and the ability to concoct nefarious plots.

Imagination by itself certainly is not bad. It's part of what brought most of us to amateur radio in the first place. It was the dream and allure of somehow being able to communicate with people in far-away places using exotic equipment to achieve this miracle—all without the use of wires. That through some amazing process we would be able to speak in some fashion to another human being we didn't know on the other side of the globe and have that person respond to us specifically, all without wires or telephone, is an awesome concept. You have to have an active imagination to take in that one. That you could really do this is one thing, but that someone would believe you did is another. This probably led to QSL cards early on as a means of proving that you weren't simply daft and that you had done the things you said you did. You could display the QSLs in the shack to impress visitors and to remind yourself of wondrous achievements. It probably didn't take much longer for the first award program to materialize. You could get a certificate to display and some sort of ranking among your peers. I'm sure this led to an added intrinsic value for the QSL card not only as proof, but also as a totem for the whole experience. We are very reluctant to part with a single card. A very emotional bond exists between us and the cards.

This leads to the second item this month, our WAZ program. By now you know that Jim Dionne, K1MEM, our WAZ Award Manager, was quite ill the latter part of 1998 and is now on the slow road to recovery. Packages and envelopes filled with cards stacked up at his home while he was in the hospital. While the process stopped, the angst built up in you who had cards somewhere in limbo and I'm sure in Jim, who was in no condition due to his precarious health to resolve the matter. When the imminent danger passed, we had some of the material hand-carried to the *CQ* offices. Dick and I began the process of sorting and checking cards so that at least the cards would be on their way back to you. As you can imagine, it is an extremely tedious process if you want to do it right. To say that Dick and I have discovered new-found additional respect for Jim's work would be an understatement. It's a lot of work, and it has to be a labor of love for the award and the hobby. By the time you read this we should have all the cards checked and on the way back to you. At this writing we are still working on the paperwork and certificate processing, plus getting a few willing hands to help out Jim.

So what is it like to look at, touch, and examine all of those QSL cards? Well, it's the stuff amateur radio dreams are made of and the reason why many of us became amateurs. It's the names of exotic countries that most of us didn't know existed before we became amateurs. It's the link to a QSO either last year or twenty years ago complete with a little note written on the back to commemorate the event. It's the reliving of a great DXpedition and the challenge of getting through pile-ups with a modest station. It's recognizing the QSL from some noted personality who also happened to be an amateur, perhaps no longer with us. It's a whole world of feelings (some envious) conjured up by these cards in your hand. From the very simple expeditious card produced via a very tight budget to the most elaborate multi-colored, foldover card, the power of each individual card is the same. While many of us certainly don't chase awards or DX, what these cards represent is the universal appeal of amateur radio, the mysterious, often capricious occurrence needed for that contact. It's wireless, with no visible connection or link to the entire world.

It this a romanticized notion? Sure, but it, like most aspects of amateur radio, relies on the imaginative quality of possibility. There are no wires, no telephone, no modem, no Internet, no service provider, no monthly fee. It's just you, the ultimate hunter, against the elements. Sure it's a romantic image when you consider that the prey may be nine or ten thousand miles away.

So when you look at QSL cards or SWL cards, they are far more than pieces of cardboard you stuff in a shoebox, or resent having to reply to, or never send out. They very well may be someone else's dream, aspiration, and highly valued prize leading to an achievement award or simply set aside to be looked at now and then in the same way you revisit old photographs.

With Jim on the mend, we hope to be on track as soon as possible. I can add from first-hand experience now that it certainly will make his job easier if you print clearly, use the proper forms, and let him know exactly what you want. With some of the material that's been sent in, it's almost impossible to determine what it's for and how it should be treated. The forms and rules for all our award programs are free. All you have to do is send an SASE and we'll get them out to you. Help out the people who do the work. They can't read your mind.

With regard to what the FCC will or will not do, my guess is that we'll all know by Dayton which way it will turn out. Whatever way it does turn out, we'll all adjust and move on. We've done so in the past, and we'll continue to do so. If anything, amateur radio history has taught us that for the most part, after a change the hobby improves and gets better. If you're a typical amateur of the median age, I'd worry more about retaining Social Security than retaining CW.

73, Alan, K2EEK

Say You Saw It In CQ

BIG THUNDER SERIES

10, 15, 20 Meters
9 Elements on a 28 ft (8.6m) Boom
Optional 40 Meter Kit

X9

Boom to Mast Clamp

Element to Boom Mounting

The Performance Tribander for the DX Years Just Ahead

- **New High Efficiency Computer Optimized Design for Maximum Gain and Ultra Clean Radiating Pattern**
- **100+ MPH Construction for Best Reliability and Long Life**
- **NEW *4L Log Cell* Driven Elements for better VSWR Bandwidth**
- **Trapless Driven Elements and Reflectors for Reliable Power Handling**
- **Interleaved Element Design for Mono-Band Performance**
- **Add-on kits available for 40 Meters**

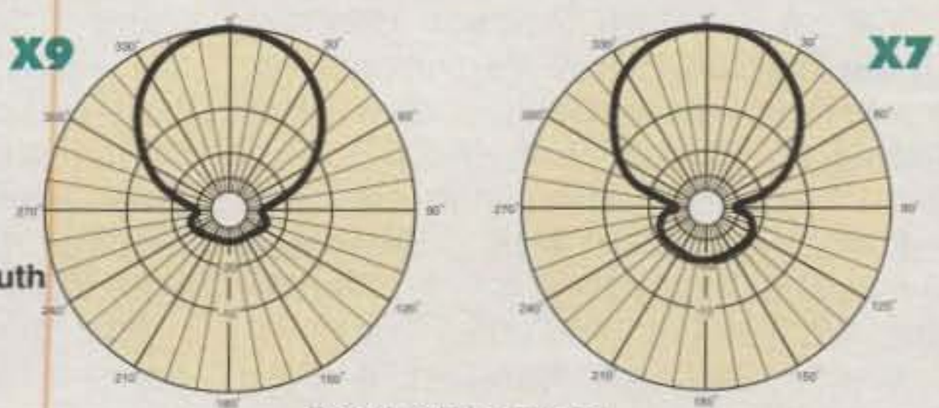
The new X9 and X7 Triband Yagis are geared to set new standards in both radiating performance and mechanical reliability. Cushcraft's product development team has employed the latest computer modeling technology to achieve a superior electrical design as well as elegant new mechanical hardware and assembly techniques.

Each mechanical component was designed to 100+ MPH wind survival with a 1.25 safety factor. Traps were eliminated from the high current driven elements and reflectors using the new *4L Log Cell* design, which yields virtual monoband performance and maximum power handling capability. Traps are employed only in the lower current directors for increased gain and sharper pattern. The result is a truly high performance antenna family which will easily handle the legal limit.

SPECIFICATIONS		X9	X7
Frequency Coverage (Meters)		10, 15, 20	10, 15, 20
Total number of Elements		9	7
Maximum Gain (dB)	20M	13.0 @ 14 deg	12.5 @ 14 deg
@ One Wavelength	15M	13.9 @ 12 deg	13.0 @ 12 deg
	10M	14.0 @ 15 deg	12.9 @ 14 deg
Maximum Front to Back Ratio (dB)		30	30
Number of Elements per Band		4	3
VSWR Minimum		1.1:1	1.1:1
VSWR 1.5:1 Bandwidth (KHz)	20M	350	600
	15M	450	750
	10M	1500	1700
Longest Element, ft (m)		36.5 (11.12)	37.2 (11.33)
Turning Radius, ft (m)		21.7 (6.61)	20.0 (6.09)
Boom Length, ft (m)		28 (8.53)	18 (5.49)
Boom Diameter, in (cm)		2-1/2 (6.35)	2-1/2 (6.35)
Maximum Mast Diameter OD, in (cm)		2-1/2 (6.35)	2-1/2 (6.35)
Maximum Wind Survival, mph (kph)		>100 (>161)	>100 (>161)
Maximum Wind Surface Area, ft² (m²)		9.9 (.92)	7.9 (.73)
Windload @ 80 mph, lb (kg)		255 (116)	202 (92)
Maximum Power Handling (KW)		2	2
Weight, lb. (kg)		85 (38.5)	60 (27.2)
List Price		$995	$675

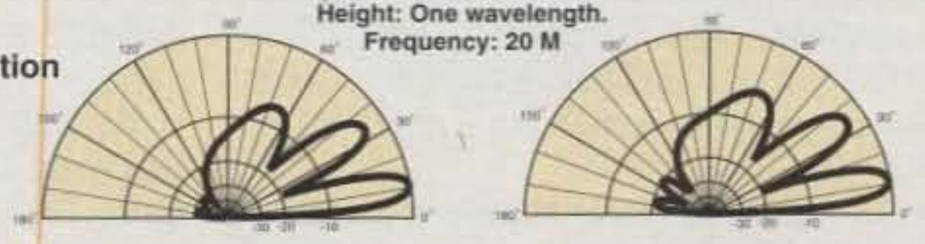
X9 X7

Azimuth



Typical radiation patterns.
Height: One wavelength.
Frequency: 20 M

Elevation



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ANNOUNCEMENTS

• **Skywarn Weather Observation Training.** Saturday all-day training Severe Weather Observation seminars are planned at various locations around St. Louis County, Missouri, on March 13, March 27, April 10, and May 1. Evening classes are planned for March 23 (Level 1) and April 14 (Weather Safety). For locations call the Severe Weather information line, 314-889-2857, for a taped message and additional information.

• **The following Special Events are planned for March:**

W4BKM, from 17th Annual Cherry Blossom Festival, Macon Georgia; Macon ARC; 1500–2300Z Mar. 27; phone 7.235, 14.240, 21.335; CW 7.135, 14.035, 21.135. For certificate send QSL and 9 × 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

W4S, from St. Patrick's Day week celebration, Savannah, Georgia; Mar. 13–20; 80 through 10 meters. For QSL send QSL to CARS, P.O. Box 23972, Savannah, GA 31403.

W4UG & LA5M, from 108th anniversary of the *Norwegian Lady*, Virginia Beach, Virginia and Moss, Norway; 1700Z Mar. 27 to 1700Z Mar. 28 on 28.363, 21.270, 14.270, 7.270, 7.130, 146.97. For certificate send SASE to VBARC, P.O. Box 62003, Virginia Beach, VA 23466 USA. For more information e-mail <w1wtg@exis.net>.

• **The following hamfests are scheduled for March:**

Mar. 5-6, **Hamfest '99,** Jackson County Fairgrounds, **Pascagoula, Mississippi.** For more infor, contact Charles Kimmerly, N5XGI, 228-826-5811. (Exams)

Mar. 6, **Kerbela Hamfest,** Kerbela Temple, **Knoxville, TN.** Contact Kerbela ARS, Kerbela Temple A.A.O.N.M.S., 315 Mimosa S.E., Knoxville, TN 37901.

Mar. 6–7, **Third Annual Hamfest Under The Sun,** Fred K. Marchman Technical Educational Center, **New Port Richie, FL**. Contact Rick, KF4GXS, 813-842-2127, e-mail: <richar@gte.net>.

Mar. 7, **SEWFARS Swapfest,** Waukesha County Expo Center, **Waukesha, WI.** Call 414-835-7035. (Exams)

Mar. 7, **MTARA Hamfest & Flea Market,** Westfield South Middle School, **Westfield, MA**. Contact Jim Allen, N1RUT, 413-536-5182, e-mail: <jim.allen@the-spa.cpm> or website: <www.mtara.org>. (Exams)

Mar. 13, **Red River Hamfest & Swapfest,** Red River Valley Fairgrounds, **West Fargo, ND**. Call Mark Kerkvliet, 701-282-4716. (Exams)

Mar. 13, **Hamcom '99**, Englewood, Florida, Tringali Community Center, **Englewood, FL**. Contact George, KA4JKY, phone 941-697-3445; e-mail: <gshreve@ewol.com>.

Mar. 13, **18th Annual Mike and Key ARC Electronic Show & Fleamarket,** Pavilion Exhibition Hall, Western Washington Fairgrounds, **Puyallup, WA**. Call 253-631-3756 (eves. and weekends); e-mail: <mwdink@eskimo.com>. (Exams)

Mar. 13, **Roseland Radio Club Hamfest,** West Orange High School, **West Orange, NJ**. Call Jim Howe, N2TDI, and Liz Howe, N2WGH, 973-402-6066. (Exams)

Mar. 13, **Ararat ARC Hambash '99**, Ararat Temple, **Kansas City, Missouri.** Contact Steve Dowdy, WJØI, phone/fax 816-941-3392, e-mail: <sdowdy@qni.com>. (Exams advance registration send completed form 610 to Exam Registration, P.O. 12757, No. Kansas City, MO 64117; fax 816-842-0800.)

Mar. 13, **Cave City Hamfest,** Cave City Convention Center, **Cave City, KY**. Contact Larry Brumett, KN4IV, 502-651-2363, or e-mail: <lbrumett@glasgow-ky.com>.

Mar. 13, **Yuba Sutter ARC Swapmeet,** American Legion Post, **Linda, CA**. Contact Clara, KC6JPP, 530-742-2674, or Ron, W6KJ, 530-674-8533.

Mar. 13, **Scottsdale ARC Hamfest,** Scottsdale Community College, **Scottsdale, AZ**. Contact Roger Cahoon, KB7ZWI, phone 602-948-1824, or 602-943-3548 (fax).

Mar. 14, **Sterling-Rock Falls ARS Hamfest,** Sterling High School Fieldhouse, **Sterling, IL**. Contact Llyod Sherman, KB9APW, phone 815-336-2434; or e-mail: <lsherman@essexl.com>.

Mar. 14, **Indiana Hamfest & Computer Show,** Indiana State Fairgrounds, East Pavilion Building, **Indianapolis, IN**. Contact Dennis Bauerfiend, WB9ZNZ, 317-996-3782; e-mail: <dbauerfiend@cleveland.dfas.mil>.

Mar. 20, **Martin County ARA 23rd Free Hamfest,** Martin County Fairgrounds, **Stuart, FL.** Contact MCARA P.O. Box 1901, Stuart, FL 34995.

Mar. 19–20, **Oklahoma State Convention**, Maxwell Convention Center, Tulsa, Oklahoma. Call Merlin Griffin, WB5OSM, 918-622-2277; e-mail: <megriffin@ionet.net>.

Mar. 20, **1999 Michigan Crossroads Hamfest,** Marshall High School, **Marshall, MI**. Contact Wes Chaney, N8BDM, 616-979-3433.

Mar. 20–21, **St. Patrick's Day Hamfest,** Midland County Exhibit Building,

(Continued on page 95)

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Results of the 1998 CQ WW WPX SSB Contest

BY STEVE BOLIA*, N8BJQ

Sunspots again! The bands are alive after several years in the doldrums. It was great to hear so much activity on 10 and 15 meters. Scores were up in almost every category, and activity was at an all-time high with over 2150 logs submitted, an increase of nearly 400 from 1997. All indications are that 1999 should be even better!

This well-equipped shack belongs to Juan, EA8LS.

DX

First place in the all band category went to 1997 champion KW8N (P4ØN). Some quick thinking and ingenuity enabled Bob to overcome mechanical problems and take the top spot. Second place went to Sergio, ZX5J (PP5JR). C46A operated by Ivo, 5B4ADA, finished third with a new Asian record, followed by EA3NY at EA8ZS and JH7PKU at V8JA. T/S champ H44RY came in sixth, with European record holder GIØKOW seventh, VO1MP edging VE3EJ for eighth, and NH7A rounding out the top ten. Nine stations topped 10 million points, compared to five in 1997, and all continents were represented in the top 10.

Pekka, OH1RY, at H44RY was the Tribander/Single Element champion, followed by Alejandro, XQ8ABF, and JM1CAX at 3DA5A. EA9AM finished fourth and 4N9BW was fifth. P43E had the top Rookie all band score, followed by KU4HZ. Just three days after the contest Pekka activated Temotu for a new DXCC country.

Ten meters showed the largest increase in scores. LU8AQE won in 1997 with 559K. In 1998, LU6ETB broke 7M and it took 3.2M to make the top 10 box. ZPØM with ZP5XF operating finished second, with CW8C (CX8CP) third, LWØD (LU7DW) fourth, and LU3HY fifth. WP3R operated by WA3FET was the clear winner on 21 MHz. Jim's 10M point effort was good for a new North American record. P43P (a Rookie) was second, followed by KH8/N5OLS, H27X, and CT98BOP. Twenty meters was closer, with 9J2A edging out CT3BX for the top spot. KL7RA finished third, with 5B4AGC fourth and LU2NI fifth. H24LP (5B4LP) led the way on 40 meters, with YU7NU second, HA9RE third, RNØA fourth, and VE3CDX fifth. The closest race was 80 meters, with the top three stations separated by less than 70K and less than 300K separating first through sixth place. Coming out on top was K1LZ, with IH9/OK1MM less than 20K behind and OK2RZ right on their heels. KE1Y was a very close fourth, and S57O finished right behind Rolf. LY6K is the new world record holder on 160, with North American record holder VE3BMV/1 less than 20K back. SP7GIQ was third, S54E fourth, and OZ3SK fifth.

Low power honors went to VP5E operated by K6HNZ. LU8HLI moved up from fifth in '97 to second in 1998. 3B8/DL6UAA was a close third, followed by 4M5E (YV5NWG) and Z38X operated by NO6X. As in the high power listings, the top 10 scores on 28 MHz all came from South America. LU9HS led the way with an excellent 3.8M effort, followed by LU5VC, LU4VZ (the 1997 winner), PU2RUX, and LU4FCZ. P43DJ won the 15 meter class, with HC6CR second, 4F4IX third, PP5UA fourth, and UA4LCQ fifth. In another close finish, IT9STX edged II3T (IV3TAN) for LP 20 meter honors. 3E1DX (HP1XVH) was third, LQ4I (LU4IC) fourth, and 4N7B fifth. HA5BSW was the top 40 meter finisher, with FK8GM second and UT1T third. CY7A (VE7SV) had the top 80 meter score, followed by S5ØQ and 4N1A. Top band honors went to LY2OU.

DLØWW just edged out EA3KU for the single op. assisted title. JM4UQM was third, DF6QV fourth, and IN3ZNR fifth. LP entrant LU3HVN was the 10 meter winner, EA3EJI took 15 meter honors, and TM7XX (F5MUX) edged out YT4I for 20 meter honors. On the low bands, YZ7ED was the 40 meter champ, S55T was the 80 meter winner, and YU1RA was the top band winner.

The QRP race was extremely close, with UR7M edging out LU1VK, YU1KN, and UX3HX for the top spot. LU7VCH was the 10 meter winner, UAØZBK/RØ the 15 meter winner, and RW9AB the 20 meter champion. W8QZA/6 won on 40, SP4GFG on 80, and UT5EER was the top band winner.

USA

KQ2M did it again! We had quite a battle for the USA championship, with KQ2M again on the top of the box. Rich, KE3Q, gave Bob quite a battle, but fell a little short. Not very far behind was K3MM. NB1B was fourth, followed by WC4E and WB9Z with a nice score from the Midwest. In seventh was Trey, N5KO, with the top west coast score. KVØQ was eighth, K3ZO ninth, and K8WT tenth. The top six stations exceeded KQ2M's 1997 winning score.

KZ5MM dominated the 10 meter class, followed by N4BP and NN5AA (K5NA). Mike, KA2AEV, won on 15 meters, with NW3Z second and WS1M third. Chuck, W7FP, edged K7ZZ for the 20 meter title, with KN6M third. On 40, AD6DO squeaked by NE5D, with KK9A third. Forty Q's and five mults separated K1LZ and KE1Y on 80. On top band, AA1BU came out on top with AA4MM second.

K1HTV won the low power all band class, with WA1LNP second, WS1A third, WO4O fourth, and K6RO fifth. W2BZR/3 repeated as the low power 10 meter champ, followed by WØAH and KKØSS. K4SN and N4MO were neck and neck on 15, with WJ7S third. AKØA is the 20 meter champion, and KW4T the 40 meter low power champ.

W9IW operated by ES2RR is the USA T/S

*7354 Thackery Road, Springfield, OH 45502
e-mail: <n8bjq@erinet.com>

champion. Even though the rate dropped a bit while eating his steak, Toivo had enough to hold off AD1C, AI2C, K6ZX/8, and N6ED. KU4HZ topped the USA Rookie section, with KB9MDL second.

NØKE is the USA QRP champion, with KB3TS second and N7VY third. WA6FGV topped the 10 meter entries, with W4DEC the winner on 15 and W6CN the 20 meter winner.

Multis

ZW5B headed up the multi-single list, with African record holder TS5I second, LT1F third, TM1C fourth, and IR4T fifth. P3A is the multi-multi champion, and Asian record holder, followed by KP3P, KH7R, OT8A, and 9A1A. KI1G is the US multi-single champion, with NE6N second, KT4W third, W7RM fourth, and WO8CC fifth. KO6N edged out KU8E for the multi-multi title, with KS3F third.

The Rest of the Story

This was the last year for the dreaded "zero point" QSO. **Starting with the 1999 contest, QSOs within your own country will count for one (1) point each regardless of the band.** Please make sure your logging program has been updated and pass the word to those who may not get to read the rules in time for the contest.

Nearly 1000 logs made it into the database this year, which is close to half of all logs received. This represented over 1 million QSOs and 65,000 calls, of which 37,000 were "unique" calls. Thanks to N6TR and N6AA, a WPX version of the software used by the CQWW was used for the first time. There were some very good logs and also some very bad logs. If you check the DQ list at the end of the scores, two stations made that box (not the one you want to be in) for having an unacceptable level of busted or unverifiable calls. There are others of you who are right on the edge. Please take the extra time to verify whom you work and also copy the report correctly. Guessing could get you on the wrong list.

Thanks to NA2X, who put in a lot of time typing in logs, and to OH1EH and EA3DU for acting as collection points in Europe. Also thanks to N6AA for the extra effort he put in to help me get the database up and running correctly.

A special thanks to all of you for supporting the CQ WPX Contest. Many get special prefixes and others just get on to hand out a few mults. We picked up nearly 400 entries in 1998. I'd like to see another 400 more in 1999. Don't forget: Every QSO is now worth something.

Keep sending your logs electronically. You can e-mail them to <N8BJQ@ERINET.COM>. Remember you will need a summary sheet and the log file. The output of most PC logging programs is acceptable, and if you use a MAC to log, you can e-mail an ASCII file. We're now up to almost 50% electronic logs and hoping for more.

The 1999 contest will be held on 27 and 28 March UTC. Rules can be found in the February issue of *CQ* or at <http://ourworld.compuserve.com/homepages/n8bjq> along with other WPX information. You can get log sheets from the folks at *CQ* for an SASE. See you in March!

73, Steve, N8BJQ

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

WORLD: Stanley Cohen, WD8QDQ Trophy. Won by **Station P4ØN operated by Bob Hayes, KW8N.**
USA: Atilano de Oms, PY5EG Trophy. Won by: **Bob Shohet, KQ2M.**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **Station EA8ZS operated by Eddie Stark, EA3NY.**
EUROPE: Jim Hoffman, N5FA Trophy. Won by: **Robert Cummings, GIØKOW.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **Station ZX5J operated by Sergio Almeida, PP5JR.**
CANADA Low Power: Amateur Radio League of Alberta Award. Won by: **Vitaly Markhasin, VE6JO.**
OCEANIA: Philip Fraizer, K6ZM Memorial. Won by: **Station V8JA operated by Takeshi Kinsho, JH7PKU.**
***JAPAN**: The DX Family Foundation Trophy. Won by: **Masaki Okano, JH4UYB.**
WORLD QRP/p: Dayton Amateur Radio Association Trophy. Won by: **UR7M.**
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Philip Krichbaum, NØKE.**

SINGLE OPERATOR, SINGLE BAND

WORLD: John N. Reichert, N4RV Trophy. Won by: **Station WP3R operated by James Breakall, WA3FET (21 MHz).**
WORLD (Low Power): Vern Fowler, W8BLA Trophy. Won by: **Djurre Vrieswijk, P43DJ.**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **Andreas Mavrides, H24LP.**
OCEANIA: D. Craig Boyer, AH9B Trophy. Won by: **Don Barclay, KH8/N5OLS (21 MHz).**
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **Krassimir Petkov, K1LZ.**
USA 7 MHz: Lewis Sayre, N7AVK Trophy. Won by: **Daniel Craig, AD6DO.**
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **Michael Samanka, KA2AEV.**
USA 28 MHz Novice/Tech: Jon Engelhardt, KAØZFX. Won by: **Robert Lutz, W2BZR/3/T**

MULTI-OPERATOR, SINGLE TRANSMITTER

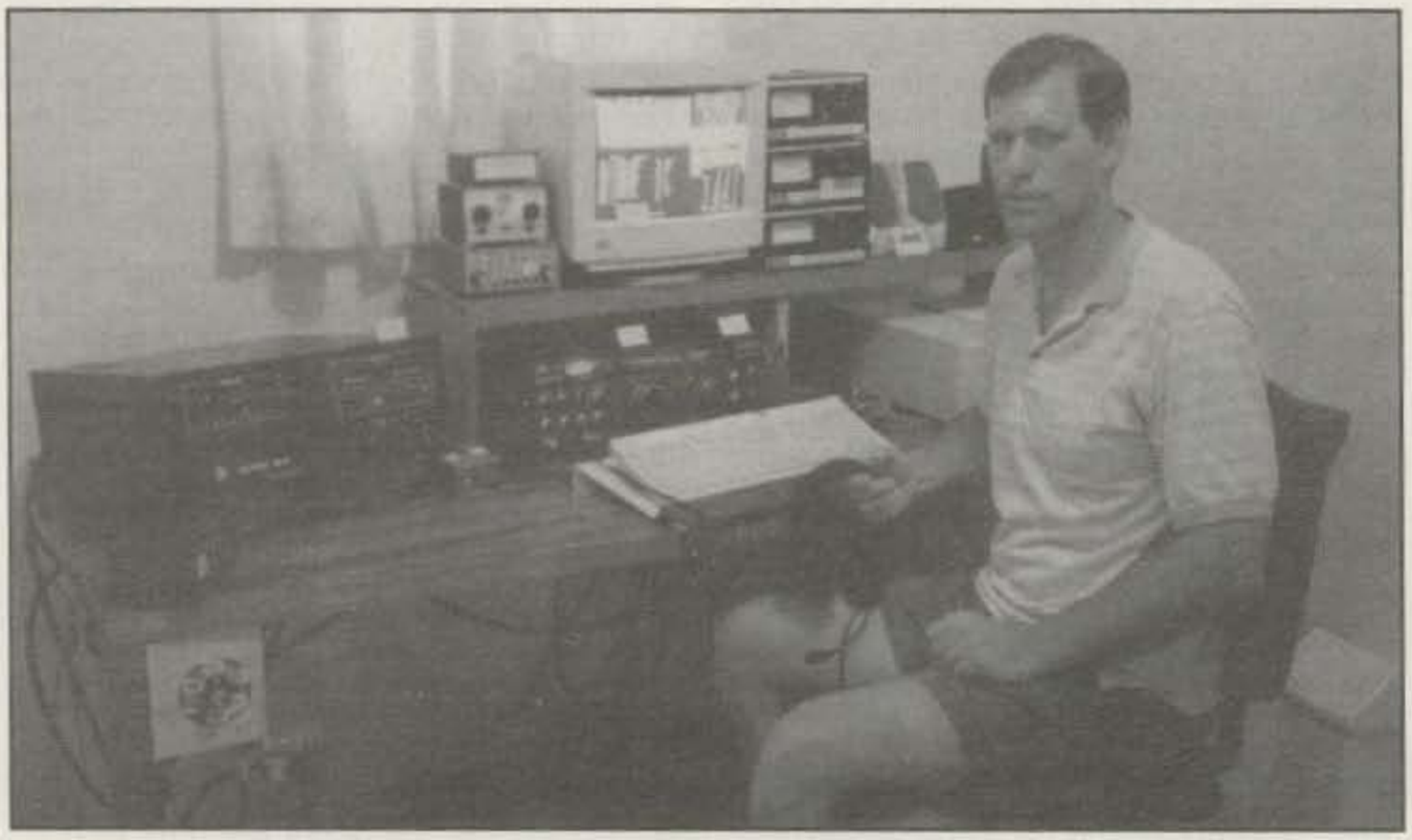
USA: Oklahoma Comm Center Trophy. Won by: **KI1G operated by KI1G, K1NG & K1SD.**

MULTI-OPERATOR, MULTI-TRANSMITTER

NORTH AMERICA: Burt Curwen, KL7IRT Memorial (James Dixon, NL7HI sponsor). Won by: **KP3P operated by NP4Z, K9PG, KP4BZ, NP3A, KP3P, KP3L, KP4Y, WP3A, KP4ZZ, NP3HM, KP4RF.**
USA: Glenn Tracey, KC3EK Trophy. Won by: **KO6N operated by N6RO, T94WW, K6AW, K3EST, N6IG, AEØM, K1KI, K2KW, JH1SBE, IK8ETA.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **Station H44RY operated by Pekka Kolehmainen, OH1RY.**



This is the 1998 world champion, P40N (KW8N operator).

Random Comments

No chance to work on 40 meters in EU QRM with low power. Twenty meters was easier, but same problem. . . . *3B8/DL6UAA*. Unbelievable opening on 10 meters. But in contrast, 20 and 40 meters were tougher than the previous year. . . . *3DA5A*. Most memorable moment: Discussing with K1AR where he writes his articles for the "Contest Calendar." Thanks, John, for the laugh early Sunday morning. . . . *8P9IJ*. Had a great time! WPX is always a wonderful contest. Super conditions to Europe on both afternoons were welcomed. . . . *AI2C*. First contest effort with more than just a few hours of operating. Lots of great prefixes, and band conditions not too bad. Now I have to move

Say You Saw It In CQ

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

P4ØN 16,903,166
ZX5J.....14,768,160
C46A 12,942,160
EA8ZS.....11,408,069
V8JA 10,932,760
H44RY.....10,687,177
GIØKOW.....10,563,579
VO1MP.....10,406,374
VE3EJ 10,216,934
NH7A.....9,601,537
XQ8ABF 9,368,768
S56MM.....8,674,899
VE7SZ.....8,617,752
3DA5A.....8,423,856
OK1RI.....7,867,396
PT7BZ 7,502,558
KQ2M 7,443,720
IR2W 7,116,858
KE3Q.....6,962,649
EA9AM 6,864,416
*VP5E.....6,831,902
DL6FBL 6,587,136
K3MM.....6,495,720
YW5A 6,346,690
P43T.....5,966,400

28 MHz

LU6ETB.....7,391,769
ZPØM.....5,462,250
CW8C.....4,590,150
LWØD 4,036,496
LU3HY.....3,906,462
*LU9HS 3,886,400
PY4OY 3,799,250
CV4Y 3,605,910
LU5MM.....3,485,470
LU5FC.....3,218,180

21 MHz

WP3R.....10,167,632
P43P 6,339,615
KH8/N5OLS 5,936,783
H27X 5,925,940
CT98BOP.....5,560,698
9K2ZZ.....5,505,271
TK5NN.....4,054,900
CT8T 4,046,224
KA2AEV 3,896,775
IH9/OL5Y.....3,774,561

14 MHz

9J2A.....7,907,625
CT3BX.....7,329,366
KL7RA.....5,221,230
5B4AGC 5,197,770
LU2NI 5,169,342
YW1A 4,731,350
SP2FAX.....4,446,900
CS98NH.....4,043,033
SL3ZV 3,927,300
OH1JD.....3,619,954

7 MHz

H24LP 4,087,536
YU7NU 2,169,144
HA9RE 1,834,860
RNØA.....1,701,678
VE3CDX.....1,446,720
AD6DO.....1,040,232
9A6KOI.....932,844
NE5D.....921,024
KK9A 794,820
UR5LCV 741,488

3.7 MHz

K1LZ.....1,373,240
IH9/OK1MM.....1,356,642
OK2RZ 1,304,670
KE1Y 1,248,450
S57O 1,226,224
OL4U 1,042,272
OM2TW.....1,008,716
*CY7A.....943,272
SP3KFH 915,768
HG6V.....708,372

1.8 MHz

LY6K.....481,164
VE3BMV/1.....464,166
SP7GIQ.....362,648
S54E.....294,560
OZ3SK.....283,920
RK3SWX 168,480
IR1A 111,540
RA4NW 105,878
YU7AU 100,464
DK4UA 77,688

LOW POWER ALL BAND

VP5E.....6,831,902
LU8HLI.....3,899,520
3B8/DL6UAA 3,486,288
4M5E 2,841,393
Z38X 2,669,238
EK6CC.....2,647,916
UT4UO.....2,629,458
K1HTV 2,585,340
P43E 2,546,892
VE6JO 2,309,490
UA9CAW 2,168,656
VA3DX 2,155,202
S57DX 2,125,614
S53EA.....2,006,250
7N3ULM.....1,912,408
UAØSJ 1,840,608
4XØF 1,686,326
TA3BN 1,680,265
YU1NR.....1,594,368
9M2TO.....1,585,480

28 MHz

LU9HS.....3,886,400
LU5FC.....3,218,180
LU4VZ.....2,937,990
PU2RUX.....2,817,488
LU4FCZ.....2,160,270
LU7HH.....1,856,148
PY2MNL.....1,648,952
LU7HN.....1,620,012
ZW5W 1,579,836
PY2XE.....1,579,320

21 MHz

P43DJ 4,236,138
HC6CR.....3,630,900
4F4IX.....2,840,255
PP5UA.....2,404,650
UA4LCQ.....1,732,154
DU3RCM.....1,671,125
UN5PR 1,613,924
CN8NK.....1,318,640
9A3B 1,230,488
JR3RIY.....1,028,193

14 MHz

IT9STX.....2,403,722
II3T 2,369,408
3E1DX.....2,275,850
LQ4I.....2,088,423
4N7B 1,938,145
9M6AAC.....1,846,256
UAØJH.....1,508,874
J42Z 1,099,336
UU7JX.....798,310
RZ9UC 700,344

7 MHz

HA5BSW 726,680
FK8GM.....634,800
UT1T 450,216
IR7S 335,420
OH4KBC.....323,536
YZ7ED.....226,008
KW4T 197,064
YZ1V 182,360
UX3M 163,072
T94DO.....153,224

3.7 MHz

CY7A.....943,272
S5ØQ.....602,580
4N1A 434,098
HA3LN.....411,190
TA3J.....356,380
VA3MG.....346,836
UX3MO.....341,496
9A4RU.....335,232
PA2SWL.....291,500
S57CBS.....276,040

1.8 MHz

LY2OU.....76,504
YU1AST 20,520
VE7SV.....10,472
UT1MW 9,576
EA1DVY 6,426

TRIBANDER/ SINGLE ELEMENT

H44RY.....10,687,177
XQ8ABF 9,368,768
3DA5A.....8,423,856
EA9AM 6,864,416
4N9BW.....4,633,910
EM4U 4,497,392
LY1DS.....4,284,720
LU8HLI 3,899,520
S57AW 3,810,447
3B8/DL6UAA.....3,486,288
HA2SX.....3,114,791
CX7BY.....3,083,339
EA3GHQ 2,934,926
LY5W.....2,927,655
OE1EMS 2,898,368
4M5E.....2,841,393
W9IW.....2,739,464
AD1C.....2,667,271
VK3TZ 2,650,582
DK9DA 2,566,635

28 MHz

*JAØRYN/7.....28,301

21 MHz

EA3QP 794,316
NH7C.....423,936
OH3BU.....312,624
*N7RQ.....124,976

14 MHz

LA8W.....1,427,976
*NN5Z.....139,815

ROOKIE

*P43E 2,546,892
KU4HZ.....1,078,896
F5AOV.....681,975
KB9MDL.....592,662
*F5BMK.....356,728
AA1SU.....314,028
VE1TRH 301,735
*F8BCZ.....274,392
*KE4ZQZ.....238,032
*KI8CS.....188,163

28 MHz

*PY2ELG.....85,860
*K6KAY/T 57,054
*F5CWU.....45,671
*EA7ASZ.....38,400
*KF6GUH 29,281

21 MHz

P43P 6,339,615
*EC7ACV.....59,285
*EC3AJQ.....17,836
*EC4AMM.....8,352
*EC4AIV 4,863

BAND RESTRICTED

*JA5EO.....430,155
*EC3AGC 335,331
*EC6PG.....71,968
*EC5AEB.....60,588
*OH3JKV.....39,370

28 MHz

*NH7CC.....196,182
*FB1CMF.....41,100
*KB4OGM/T 39,858
*FB1BJI 24,651
*FB1UAW.....10,812

21 MHz

*EC5AHC 113,625
*JA9SCB/1 49,140
*EC1DMQ.....48,300
*EC7DNE 21,504
*EC4AGQ.....12,750

3.7 MHz

*S57KAA 258,990

QRP/p

UR7M.....A.....628,544
LU1VK.....A.....605,160
YU1KN .....A.....593,823
UX3HX.....A.....502,918
LY2FE.....A.....451,257
LU7VCH.....28.....485,550
LW3DWX .....28.....457,072
JA5GPJ.....28.....85,675
UAØZBK/RØ ..21.....398,890
VE7SBO.....21.....269,230
RA3RCL.....21.....133,852
RW9AB .....14.....422,733
W6CN.....14.....88,560
SP9EWO.....14.....53,295
W8QZA/6 .....7.....15,368
SP4GFG.....3.7.....80,500
YU1KNO.....3.7.....26,136
UT5EER .....1.8.....30,757
VY2MGY/3....1.8.....14,400

SINGLE OPERATOR ASSISTED

DLØWW .....A....4,826,142
EA3KU .....A... 4,578,060
JM4UQM.....A....3,370,950
DF6QV.....A....2,885,740
IN3ZNR.....A....2,809,190
IO4A.....A....2,780,163
KC6ETY.....A....2,711,520
GX4WSM.....A....2,349,896
EA5AEY.....A....2,289,671
OH9MM.....A....2,063,901
*LU7HVN.....28.....722,917
*JL4CVG.....28.....80,765
EA3EJI .....21.....608,572
K2UT .....21.....290,672
*WR3L.....21.....279,300
TM7XX .....14...2,381,148
YT4I.....14...2,081,715
DL3NED.....14...1,866,880
LY8X .....14...1,635,093
*PP5JD.....14...1,314,010
YZ7ED.....7.....226,008
S55T .....3.7.....516,530
S57M .....1.8.....280,884
*YU1RA .....1.8.....36,414

MULTI-OPERATOR SINGLE TRANSMITTER

ZW5B 18,385,518
TS5I.....16,157,168
LT1F 13,735,669
TM1C.....12,703,590
IR4T.....12,499,872
HG1S.....12,476,200
6V1C 11,859,608
AH2R.....11,164,400
OG5F.....10,957,298
KL2A 10,792,866
UPØL 10,021,968
A61AJ.....9,694,336
TM2V.....9,333,120
9A7A 9,202,390
M8T 9,104,734
UD6M 8,946,102
S58AB 8,839,176
OHØW 8,769,920
S53M.....8,397,000
OH5LF.....8,378,880

MULTI-OPERATOR MULTI-TRANSMITTER

P3A 41,053,560
KP3P 35,453,750
KH7R.....25,932,036
OT8A.....25,763,088
9A1A 25,278,840
LU4FM.....20,375,872
EA4URE.....14,746,239
RK2FWA 12,036,925
KO6N.....11,736,064
RZ3Q.....10,674,792
** Low Power*

the tower work to the front burner. Will be back next year. . . . *AJ4Y.*

Operating time was very restricted, missed 20 and 40 meters. Very happy to give out this special prefix to all who called. Thanks to the Communications Ministry officials who obliged with a special call. . . . *ATØPTT.* I enjoyed this contest with my personal station. More and more personal stations will join this contest from now on, I think. . . . *BD4DW.* High-band propagation have been good. I would like to operate with all band. But, unfortunately I could not prepare 3.5 MHz antenna. . . . *BPØRIW.* Very difficult to work barefoot with so many top guns, not only high power but "very wide." Despite all, a very pleasant contest. . . . *CE6DFY.*

Wanted to do an all band effort and started antenna building on Tuesday. The only antenna I really got working was the 40 meter Yagi. I decided to go for single band, but the WX on the weekend was so nice that I operated only a few hours and worked on the antennas for the other bands again so there would be less work before the next contests. I now have the 20 meter antenna running as well and hope 15 and 10 will follow as easily. . . . *DF4SA.* Propagation better than last year but not good enough. The W/E path is not really working. Low activity from Africa. Also the second 4-el quad at 40 meters height was down dur-

USA TOP SCORES

SINGLE OPERATOR ALL BAND

KQ2M	**7,443,720**
KE3Q	6,962,649
K3MM	6,495,720
NB1B	5,943,884
WC4E	5,151,406
WB9Z	5,022,057
N5KO/6	4,229,984
KVØQ	4,180,376
K3ZO	4,066,916
K8WT	3,631,375
K4VUD	3,403,400
K7RI	2,810,665
W9IW	2,739,464
AD1C	2,667,271
*K1HTV	2,585,340
AI2C	2,375,753
W9LT	2,249,496
K6ZX/8	2,171,402
N6ED	2,116,988
N8II	2,004,781

28 MHz

KZ5MM	710,636
N4BP	378,784
NN5AA	264,500
W4WX	157,000
***W2BZR/3/T**	**78,848**
W9WI	78,390
*WØAH	68,508
*KKØSS	54,936
*NA5TR	46,500
KF6JFG	41,679

21 MHz

KA2AEV	**3,896,775**
NW3Z	2,623,854
WS1M	1,275,408
K5XR	1,095,364
*K4SN	868,560
WIØWA	849,676
*N4MO	835,028
KØEJ	502,933
WW4RR	420,550
*WJ7S	396,552

14 MHz

W7FP	634,908
K7ZZ	600,041
KN6M	587,860
WBØO	519,466
*AKØA	492,997
N1CC	490,599
WB2OSM	369,754
*K2BQW	212,948
WA3DMH	194,967
KD8SQ	166,362

7 MHz

AD6DO	1,040,232
NE5D	921,024
KK9A	794,820
NC4NC	216,690
*KW4T	197,064

3.7 MHz

K1LZ	**1,373,240**
KE1Y	1,248,450

1.8 MHz

AA1BU	39,760
AA4MM	12,154

LOW POWER ALL BAND

K1HTV	2,585,340
WA1LNP	1,406,082
WS1A	1,210,941
WO4O	1,193,297
K6RO	1,188,770
ACØW	1,161,000
WO9S	808,411
W5MN	782,620
WW8DX	565,095
W7YAQ	543,840

28 MHz

W2BZR/3/T	78,848
WØAH	68,508
KKØSS	54,936
NA5TR	46,500
KB4OGM/T	39,858

21 MHz

K4SN	868,560
N4MO	835,028
WJ7S	396,552
WA7BNM	386,104
KW2O	326,109
WR3L	279,300
N9SXT	201,500
KØBCN	181,442
W9HV	162,426
NP4IW/WX6	142,776

14 MHz

AKØA	492,997
K2BQW	212,948
NN5Z	139,815
WG1Z	136,566
KL7NL/WZ4	134,724

7 MHz

KW4T	197,064

TRIBANDER/ SINGLE ELEMENT

W9IW	2,739,464
AD1C	2,667,271
AI2C	2,375,753
K6ZX/8	2,171,402
N6ED	2,116,988
W6TK	1,764,788
W1CU	1,668,108
KI6CG	1,504,230
*WD5K	1,363,672
KMØL	1,340,408
KGØZI	1,322,838
K6BZ	1,251,488
WC1M	1,225,150
WA4TTI	1,096,983
KC6X	1,094,512
KE8GG	1,025,545
*WN6K	990,756
*NA2Q	861,670
ND5S	805,396
W1TE	727,301

ROOKIE ALL BAND

KU4HZ	1,078,896
KB9MDL	592,662
AA1SU	314,028
*KE4ZQZ	238,032
*KI8CS	188,163
*N3XQP	169,404
*KQ6ES	168,740
*AB7RW	167,832
*AB1BX	159,950
*N9TU	122,740

28 MHz

*K6KAY/T	57,054
*KF6GUH	29,281

21 MHz

*KIØJZ	4,860

BAND RESTRICTED

28 MHz

*KB4OGM/T	39,858
*KE4MVK/T	1,554

QRP/p

NØKE	**A**	**316,744**
KB3TS	A	188,079
N7VY	A	179,800
N1TM	A	177,813
WA5OJI	A	133,608
WA6FGV	28	27,258
W9PNE	28	11,826
W4DEC	21	82,770
W6CN	14	88,560
W8QZA/6	7	15,368

SINGLE OPERATOR ASSISTED

KC6ETY	A	2,711,520
NA2NA	A	2,018,520
WØGJ	A	1,609,920
W3BGN	A	1,547,340
W4MYA	A	1,412,014
K4MA	A	1,408,750
N5JR	A	1,363,450
*WW3S	A	1,296,554
W1NG	A	1,293,302
K7ZUM	A	1,196,069
K2UT	21	290,672
*WR3L	21	279,300
*W9HV	21	162,426

MULTI-OPERATOR SINGLE TRANSMITTER

KI1G	**8,228,000**
NE6N	5,764,928
KT4W	5,135,972
W7RM	4,836,048
WO8CC	4,448,520
K5TR	4,227,678
N4TO	3,817,602
KC7V	3,736,730
NK7U	3,606,460
NX5M	3,551,432

MULTI-OPERATOR MULTI-TRANSMITTER

KO6N	**11,736,064**
KU8E	10,553,760
KS3F	8,868,649
KB1H	2,296,703
AI4R	2,296,188

*Low Power

ing the contest. Worked KH2 as DXCC #204. . . . *DL1TS.* First time to join WPX contest. I enjoyed it and will surely try again. . . . *DU3RCM.*

My best CQ WPX score as Single Op ever! Great opening to JA both days, bad CONDX (low activity) to the US. When I decided to go to 160 meters on the second hour, I discovered I had no antenna! Later on I found somebody cut feedline of 160 meter antenna, so no 160 this time. . . . *EM4U.* Very successful, I hope, but no real openings to JA. . . . *G3SEM.* All in all a good trial for the second-hand TH6 I installed the previous weekend in place of the Gem Quad. . . . *GW8J.* Not so nice condx like in week before contest. Beautiful contest. I like WPX. . . . *IH9/OL5Y.* Always a great competition, and this year thanks also to a better propagation, I improved my personal score of 294.55%! . . . *IK4QJM.* This is my first contest with this call. . . . *IZ3CDH.*

It was excited for me that I could contact more than 150 stations with my barefoot radio system. . . . *JA9SCB/1.* Few USA stations did watch (QSX) JA phone band on 75 meters. But KO6N, W7RM, NE6N = Japanese operators QSX on JA band!. . . . *JE1SPY.* Condition was very good to world wide. It was interesting and exciting contest. . . . *JF2FIU.* I am satisfied with my best score in this contest. . . . *JH4UYB.* I decided to participate the contest the day before and traveled Tokyo to Okayama for 5 hours. The condition is much better than last year. I especially enjoy 15 meter opening. . . . *JM4UQM.* My first entry. Only 10 minutes QRV!. . . . *JR3BVX.* High band conditions very good. I was so excited huge pile-up from Europe. . . . *JR4QZH.*

Had a lot of fun. Great to compete with the big guns. . . . *KØDAT.* What a relief when I finally figured out Tango X-ray Kilo 8 Kilo's (TXK8K) callsign. Sure miss Pacific QSOs. Aren't there any contesters out there?. . . . *K1DWQ.* Eighty degree temperature in March precluded more operating time. . . . *K2CS.* Moving, tower coming down. Last test for a while. Love WPX! . . . *K2FR.* I'm convinced any contest where one out of two contacts is a new mult has to be the best! This was my first effort in WPX and I really enjoyed it. The bands were all in very good shape. Thanks to everyone for such a great contest. . . . *K4JYO.* Only operated 14.5 hours due to other activities. Conditions at the beginning were very good. Best 75 meter conditions in quite some time. Ran 120+ Europeans on 75 meters in 2 hours. Conditions on Sunday seemed worse, but still not bad compared to more western US stations. Fair amount of exotic DX called in Sunday on 20 and 15. . . . *K4MA.*

Did New Zealand sink in the ocean? Didn't even hear ZL. . . . *K4SN.* Excellent conditions Fri. evening and Sat. On Sunday the band never came alive into EU. Very poor stateside signals both days. . . . *K5XR.* Nice to see better conditions than last year and such good participation. . . . *K6BZ.* I heard very few Europeans either day. Those heard were hard to work. Noise was high and propagation seemed poor. I've got a 40 meter beam now but el Nino has kept me from getting out to put it on the tower. . . . *K6GT.* Surprised what my vertical could do. . . . *K9JE.* A BIG thank you to N2RM for permitting me to pilot his Superstation for the weekend!. . . . *KA2AEV.* Condx were great!. . . . *KC5ZJA.* This is my best contest ever. The DX is great and the bands cooperated. . . . *KC6ETY.*

Nice to see some condx on the bands this year. There was a shift in condx and Saturday and Sunday were quite different. Nice EU opening on Sunday but not on Saturday. Also nice to hear some stations on 10 meters. Best DX A61 on one call and 9G1YR calling me! Managed to break 1M. See you in WPX CW. . . . *KC6X.* Had fun. Band in fair shape. Way too many guys with amps running wide open. . . . *KC7ZRH.* I just got new logging software and had never done WPX before. I started having fun and hung in there for a while with a lousy antenna. . . . *KC8FXR.* Had a great time. That KQ2M is hard to beat! Congrats to him and to the W3EA station. Tnx to K3ZO for his '96 log to benchmark against. . . . *KE3Q.* Saturday was great. Band was wide open. Contacted VK4DZ *my first!* Another thing that will always remind me of this contest is the contact with ZL1ANJ on Sunday. I listened to his call for 7 minutes in disbelief—New Zealand. But the thing I'll always remember is all of the great radio operators on. Thanks, *CQ.* . . . *KE4HXU.*

Just completed building the new station the day before, after being QRT for almost 14 years. The last antenna was installed 2 hours before the start of the contest. Great to be back on the air!. . . . *KG6OK.* The contest was fun and I found a lot of folks behaving quite nicely considering there was a major contest going on. I remember back in the '80s it wasn't always so pleasant. . . . *KH6T.* Wind was so strong Saturday that I actually got to watch the tree fall across one of my beverages. LOUD!!. . . . *KJ9C.* I started the contest on 40 meters with the intent of spending a few hours to work some DX. I had so much fun and I wound up operating for 24 hours. . . . *KK9A.* Well, I paid the big bucks for a super chair. Didn't work. My butt hurt all day Monday anyway. . . . *KL7RA.*

Worked Vietnam! . . . *KM7TM.* Best WPX score ever. Can't wait to get the TH6DXX up! . . . *KN7T.* This operation survived multiple equipment failures and a frightening health problem. Had lots of fun as 15

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CONTINENTAL LEADERS

AFRICA

1.8	No Entrant	
3.5	IH9/OK1MM	1,356,642
7	No Entrant	
14	9J2A	7,907,625
21	IH9/OL5Y	3,774,561
28	EA8LS	1,151,590
AB	EA8ZS	11,408,069

ASIA

1.8	No Entrant	
3.5	*TA3J	356,380
7	H24LP	4,087,536
14	5B4AGC	5,197,770
21	H27X	5,925,940
28	9K2JH	509,425
AB	C46A	112,942,160

EUROPE

1.8	LY6K	481,164
3.5	OK2RZ	1,304,670
7	YU7NU	2,169,144
14	SP2FAX	4,446,900
21	CT98BOP	5,560,698
28	CT98EEN	663,536
AB	GIØKOW	10,563,579

NORTH AMERICA

1.8	VE3BMV/1	464,166
3.5	K1LZ	1,373,240
7	VE3CDX	1,446,720
14	KL7RA	5,221,230
21	WP3R	10,167,632
28	KZ5MM	710,636
AB	VO1MP	10,406,374

OCEANIA

1.8	No Entrant	
3.5	No Entrant	
7	*FK8GM	634,800
14	KH6T	2,681,684
21	KH8/N5OLS	5,936,783
28	VK1PJ	1,039,344
AB	V8JA	10,932,760

SOUTH AMERICA

1.8	YV2IF	17,248
3.5	YV6DBX	421,032
7	CE8EIO	711,022
14	LU2NI	5,169,342
21	P43P	6,339,615
28	LU6ETB	7,391,769
AB	P4ØN	16,903,166

MULTI-SINGLE

AF	TS5I	16,157,168
AS	UPØL	10,021,968
EU	TM1C	12,703,590
NA	KL2A	10,792,866
SA	ZW5B	18,385,518
OC	AH2R	11,164,400

MULTI-MULTI

AF	No Entrant	
AS	P3A	41,053,560
EU	OT8A	25,763,088
NA	**KP3P**	**35,453,750**
SA	LU4FM	20,375,872
OC	KH7R	25,932,036

**Low Power*

A rare sight these days. This is the homemade PA used by DL8UD. It's certainly not portable.

Here are some of the ops at VU2JNA. Standing with the mic is VU2RIG. VU3PVN is standing behind him. Logging is VU2LNZ, and VU2CAV is working the multiplier sheet.

opened (finally!) and was amazed at the activity out of XU, HL, VU, UA9, and SV. Had my first ever 100 hour of 6 pointers on 80! Special thanks to WE3A for his hospitality and the use of his fine station. . . . *KQ2M.* Just fooling around between weekend chores. Missed any 10 meter openings to other than SA if there were any but 15 meters was a joy that just keeps getting better with each test. . . . *KS4XG.* Fifteen condx spotty to Eu Saturday, but still able to work a few for mults. Still able to work new prefixes in this contest even total over 3500!. . . . *KS7T.*

Not much of a score but I beat last year's effort anyway. I'll be back for more. . . . *LA8ZJA.* Much activity during the Saturday, but then Sunday only can worked the 50% than they've heard VK-ZK. . . . *LU2DW.* Thanks to LU7NN for letting me use his antenna and QTH. . . . *LU2NI.* It was the LU6ETB's CQWW revenge! Number 0, many problems, and travel for work, making for me a headache contest. . . . *LWØD.* I really enjoyed WPX! Had a lot of fun! Sorry, bad condx to USA on Sunday, especially to East Coast!! . . . *LY8X.* Didn't cook the "Gold Fish" this time. I only ran 100 watts. . . . *N1CS.* Lot less stress on 15 than 20! Condx much better on Saturday than on Sunday!. . . . *N4MO.* JA opening Saturday on 15 meters was awesome. First real attempt in WPX. Glad to see the sunspots back. . . . *N5OKV.*

I heard a lot more Europeans than heard me. Still got two new countries. . . . *N6TPT.* Some strong stations were bad in receiving/operating, some low signals took me at first time JA opening Saturday on 15 meters. . . . *N7RQ.* DX highlight was being called by XU2A, then 3W6WE three Q's later in a run of six straight mults second day. Condx to JA were very poor on 15 meters except first hr. 20 meters to JA was fair, but very poor activity. It was fun, one of my favorite tests. Like all the mults/rare prefixes. . . . *N8II.* My first time working WPX contest—lots of fun!. . . . *N8WTH.* Condx were great. . . . *NB1B.* Disappointed to work fewer than 145 JA's, but pleasantly surprised to work 118 EU stations with just an 80 ft. high Cushcraft 40 meter beam. . . . *NE5D.*

What a difference a year can make. I more than doubled my score from last year. . . . *NI2P.* My first serious effort in WPX. . . . *NW3Z.* Was fun to operate first from DL (DK5AD) and then from OE. . . . *OE2BZL.* What wouldn't a club member do to maximize the total score—although bad flu made the operation less enjoyable! One for all and all for CCF!. . . . *OH1RX.* Saturday evening strike with some water pump problems so I had to concentrate more on family welfare than contesting. . . . *OH5BM.* Strange condx. From here 20 meters was very poor, even 15 meters was much better with a brief evening opening to the morning because I catched a bad cold and on Sunday I had to take my son to the hospital's emergency service due to an injury. Fortunately nothing serious. Despite these "hello's" from Mr. Murphy, I enjoyed every moment of this contest. . . . *ON4CAS.*

The balloon antenna did very well. We filled the balloon with helium and attached the balloon to a thin copper wire and matching unit was used to get it to 50 ohms. . . . *ON5ØNOL.* Due to visitors, my time was somewhat restricted. Next year I will compensate accordingly. Hi Hi. . . . *P49M.* TVI brought me closer to my neighbors again. Hi. . . . *PA3DMH.* Nice conditions and even a low Windom antenna (20 feet) works

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on 160. Less time than previous year but bigger score. . . . *PA3GAB*. Some strong stations were bad in receiving/operating, some low signals took me at first time. . . . *PBØANR*. This is my first contest WPX that I participate which I had opportunity to work several countries and special prefixes. . . . *PY2DJ*.

Moving, tower coming down. Last test for a while. Love WPX! I am totally satisfied. . . . *RA9XF*. Not much you can do with a vertical nowadays from Moscow. Hi!. . . . *RK3DT*. Nice contest! I was sorry that first day I was working only with LP 100W, so next day I tested the linears. . . . *S5ØR*. I am totally satisfied with my second contest ever. 73 and see you in the CW with longer boom!. . . . *S51A*. Band died out and recovered again for at least three times Sunday afternoon. What a mess Papa Sun's making up there!. . . . *S53R*. Nice contest but poor cond to USA. . . . *S57M*. Much better conditions than 1997. Nice to see 15 open to whole USA including W6/W7. USA on 10 meters only from Florida but a lot of South American multipliers makes this band interesting. . . . *S59ZA*.

Good conditions, except for 10 meter band. My first CQ WW contest was in 1956 as UA1KBB; then since 1965, as UW1BM, later as U1BA. Every time had a great fun. . . . *U1BA*. I have many new contacts and have good DX. . . . *UPØSJ*. I was happy to use my special contest callsign first time. . . . *UP5F*. Looked like another wipeout condx for the weekend, but the second night band opened to Europe to beat the record. TS870 mods and DSP helped to fight QRN, thanks to those who persisted. . . . *VE3BMV/1*. Was propagation down or was there less activity? El-Nino—el stinko this year! . . . *VE3DO*. I don't know whether praise or pity is appropriate for any soul that tried to tame ten from this latitude. Could have used a fixed array pointing SE and worked 99%. Even when the band opened "directly" to Europe, the path for all but the CT's and EA's was still bent to due East. . . . *VE3KZ*.

Higher bands opened nicely (especially 10 meters on Sunday afternoon). . . . *VE3STT*. A personal best. Enjoyed it very much. Looking forward to the next one. . . . *VE3WIB*. Lots of activity and reasonable conditions. What more could one ask?. . . . *VE3ZZ*. Doubled the number of DU's worked in the last 30 years during the last 30 minutes I was on the air. . . . *VE7YJ*. A great way to celebrate the beginning of a new cycle, a veritable smorgasbord of "goodies"! We can look back and say "WPX was really great in '98". . . . *VK2ARJ*. Gave out numbers to those who were calling CQ, time permitting. Lot of fun, some new countries worked, great conditions on higher bands. . . . *VK3IO*. I can see where the poet got the inspiration for the expression: "Empty vessels make the mosr noise!" He listened to an SSB contest. . . . *VK8AV*.

Only my third major test. Hope to take part in many more. . . . *VO1WET*. Surprised not to work any NA on 28 Mc. . . . *VR98BG*. Worked all continents the first 24 hours, but band barely opened the second 24!. . . *WØAH*. At age 82, I can't spend as much time on the air. . . . *W2FGY*. Visit my station on the Internet at <http://members.aol.com/w2yr/w2yr.htm>. . . . *W2YR*. Lots of interesting DX out there. Got a late start Friday night but when finally got up to the shack and turned on the rig, it was tuned exactly on A61AJ who was booming through at 59+10. Promptly worked him on m8JA on 75 meters Sunday morning. Another highlight was the wild ride 15 meters came up with on Sunday afternoon. Europe was coming in at 120 degrees, Mexico at 90 degrees, South America, the Caribbean, Alaska, Hawaii, and the South Pacific all at the same time. . . . *W8AEF*.

My warmest thanks to Jim, W9IW, and his dad John for their wonderful hospitality. Three hot meals a day, served right in the shack, and good propagation—what else could a contester want? The rates dropped a little while trying to eat the steaks during the 15 meter run (no DVP). Great experience to work the contest from this side of the Atlantic. . . . *W9IW*. Best score ever. Thanks sunspots and computer logging. . . . *WB8TLI*. KT34XA stopped working at 2300Z Saturday. Would not take power AND would not hear. Sunday while lowering the tower found that the coax had a huge slice in it. Center conductor pushed through the braid and outer skin causing dead short. Rather than try to fix it, I went on the wire and did 15 and 10 also. . . . *WF1L*.

Several people asked what state I was in. When told to look a the callsign they said "Oh, Iowa!" This gave several of the G's a good chuckle. . . . *WIØWA*. My third time playing in this game SO/AB/LP; nearly tripled my 1997 score. I exceeded my goal, which was to pass the 987,936 points produced last year by USA leader WA4ZXA. . . . *WO4O*. Nothing but birdies on 10 meters until I disabled the garage door opener and plucked some LU's. . . . *WS7V*. Lots of fun; wish I could have put in more time in the contest. . . . *WW4RR*. Thanks for a more level playing field. Used a tribander at 25 feet fixed on Europe with no rotor and a vertical for the low bands. . . . *WY9L*. The WPX contest is one of my favorite contests. . . . *YB2LAB*.

Did much better than last year but cannot be satisfied. Lost a lot of US mults—a small 3 bander lying on the roof fixed to EU is not the best antenna for serious contesting. Although condx were not bad, never got a real pile-up. . . . *YM2ZW*. This is my first WPX Contest . . . *YO5CMW*. This was my 23rd CQ WW WPX SSB contest and my 1996th contest log entry at all. . . . *YU7SF*. Propagation was not in 160 tunnel in my location. . . . *YV2IF*. It took me 3-1/2 hours approximately to replace the faulty FT990 by the IC735 and get back into the contest. . . . *ZS6HO*. I decided to throw a new twist on WPX test this year by declaring that I would operate both modes QRP. I had never operated on QRP SSB before, but of course I wanted to have a challenge. It was fun. . . . *AA8UP*.

Getting through the QRM was very hard. Some stations were so wide a greyhound bus could have driven through. . . . *GM4ELV*. Cycle 23 is here!. . . . *JA5GPJ*. Thanks to W6OAL for having me guest operate his fine station. We used to operate together with the Teenage Amateur Radio Club in Akron, OH in the late 1950's. . . . *NØKE*. Funniest comment heard: Contester: "I need a serial number!" Response: "You need the one from my radio?". . . . *N7VY*. Got the boys on H4 on 40 meters with my 5 watts and low dipole. Three days later it becomes a new country. I'll never get them after that. . . . *W8QZA/6*. Thought it was all over with when a cold front ripped through with 70+ mph winds! When I opened my eyes, I looked out the shack window and my vertical said Let's Go!. . . . *WB7OCV*.

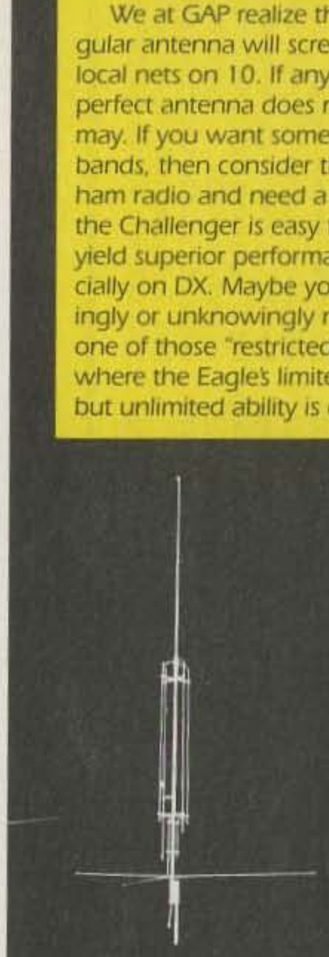
FB condx to EU, but poor condx to US. . . . *AH2R*. Great contest! Lots of fun! But where were all the USA big guns? How can grown men make expensive transceivers sound like they came from K-Mart? We live and work in Hungary. . . . *HA/WØYR*. Again together after 2 years and again a very nice experience. Good result for our working conditions. . . . *IQ9A*. This is a great contest!. . . . *KP2/WJ8C*. Had a ball as usual. Just the wife and I this year at new QTH. Next year hope to have new antennas up. . . . *KT3T*. Operated with N4RV at his QTH. We're in the process of rebuilding the station. . . . *KT4W*. Last-minute change in plans forced us to throw together our first HP effort from N4VHK as M/S (comleaser). . . . *KU4BP*.

The tribander broke so we had to use the V-beam on all bands. It seemed to work okay, particularly on 15 meters. This was the first time we have entered WPX and we thoroughly enjoyed it. . . . *M8J*. We were having fun until about 1800Z Saturday when the tent blew over on us. About one-half hour later we were back operating. . . . *N3VIA*. We met all of our goals. It was great to be on the receiving end of a Russian pile-up. . . . *NN6NN*. This was my first major multi-op from my new location. We certainly found not having 40 meter beams up yet leaves us behind the competition. Broke in a couple of new ops to the contesting scene. . . . *NX5M*. Missed a few first minutes of the contest because some usual "messing" with the computers. Luckily enough that was about only trouble faced, and we could well concentrate on our "mission". . . . *OG5F*.

Last multi operation from OH5LF's for a while!. . . . *OH5LF*. All of the team enjoyed WPX very much with the exception of one operator, who absolutely lost his voice during the contest. That was the reason for our sometimes strange signal. . . . *RK9CWW*. This DXpedition has been planned for the WPX contest from I5. Tnx to every guy for the non-stop pile-up during all the contest and thanks to the Tunisian friends for kindly hospitality. . . . *TS5I*. We fielded a record 23 operators for our second contest ever at the club station. Everyone had fun, including VA3PIE and VA3QMX, who won the "VE3MIS persistent loggers

GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX

Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

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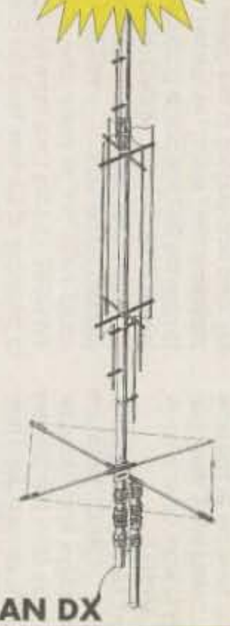

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Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$289
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$319
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award". . . . *VE3MIS*. Thanks to all who worked us! 15 meters was great! Can't wait for 10 to fully open—come on, sunspots!. . . . *WV2LI*.

It is our first international contest. Very excited. . . . *YB3ZES*. Many thanks to all operators for one of the most wonderful contest experiences!. . . . *J43PTR*. Our first trying to WPX SSB. Big Fun! We will be back in next year. . . . *JA6ZPR*. We had a lot of fun. This has been the greatest operation of the Puerto Rico Contest Club and the biggest effort in this home. . . . *KP3P*. First time for our group to do multi-multi in WPX SSB. Looking forward to the new points rule next year. . . . *KU8E*. Great contest. This was not a serious effort, as I had two new contesters to train. Watch out for us next year. We had a lot of fun. . . . *N5KB*.

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DK1NO: DK1NO, DL1IAO, DL2MEH. **DLØBI**: DK1QH, DL1YFF, DF6VI, DF9VF, DL8YFC. **DLØER**: DK3JW, DL6ECA, DL6EX, DL9LR, DF5EM, DJ9NA. **DLØRT**: DJ3SL & DL7AOS. **DLØSLZ**: DE1SLZ, DGØOMT, DH8WW, DL1AQU, DL3ARK. **DLØTS**: DF7EME, DJ9KM, DK7ZL, DF7PGF, DF7ZS, DK3SX, DL2FP. **DL3KZA**: DL3KZA & DL1KZA. **DL7UZO**: DL7UZO, DL7UVO, DL7VDX. **DX1CW**: 4F1FZ, DU3ALA, DY3MRT, 4F1GYE, 4D1PMD, DU1WHO, 4F1CJC, 4F1EBC. **DX1E**: 4F1EJD, DY1RAN, DY1KXF, DU1NUF, DU1MQA, DU1OOP, DY1FDD, DY1FYU, DU1RSM, DU1RGD, Richie, Nyssa, Eryl. **DX1RN**: DU1LER, DU1PUI, DU1OGD, DU1MDU, DU1ZSD, DU1PMK, DU1NRA. **EA1EEY**: EA1EEY, EA1CUB, EA1DZW, EA1CS, EA1BXW, EA1BTW. **EA4BHO**: Club Group. **EA4RKU**: EA4AD, EC4AGR, EC4AHY, Jesus, Raul. **EA5URL**: Club Group. **ED8CMT**: DF8XC, DL7AU, DL7UBA, DL7URB, DL7VRO, EA8AJX.

EN5J: UU1JA, UU2JO, UU2JZ, UU3JD, UU4JDX, UU5JR, UU8JY, UUØJX. **ES5Q**: ES5MC, ES5MG, ES5QX, ES5RN, ES5RW, ES5RY. **EX9A**: EX2M, EXØM, EX8W, EX7NM. **F6KRK**: F8CIW & F8CHL. **G4KNO**: G4KNO, G4AXX, G4CWH, GØIJZ, G4EA4BLE, GWØARK, GWØLKA, GWØRYT. **HA/WØYR**: WØYR & N9NC. **HB2CA**: HB9SL, HB9AIU, HB9DLE, HB9BGV, HB9BTL, HB9DDO, HB9CMZ. **HB5OK**: HB9FAQ, HB9OAB, HB9FBM, HB9FBS, HB9PUE, HB9CAT, HB9FBL, HB9DLV, HB9AGC. **HG1S**: HA1TJ, HA1DAC, HA1AH, HG1DAI, HA1DAE. **HLØZX**: Club Group IN-HA University Amateur Radio Club. **HS5AC**: Club Group. **II4T**: IK4MHB & IK4UPB. **IK7YTT**: IK7YTT, IZ7AUE, IZ7BJT, IZ7BFQ, IW7DCH. **IO2A**: I2IFT, IK2HKT, IK2XEF, IK2XSL, IK2CIO, IK2XRW. **IO2L**: I2OKW, IZ2AZC, IK2MLV, IK2PFL, IK2HAJ. **IQ7R**: IK7TYZ,IK7WPH, IK7VJZ, IK7LYL.

IQ9A: IT9AJP, IT9CML, IT9INO, IT9STG, IT9TJH, IT9YHR. **IQ9K**: IT9KWF, IT9BLB, IT9EWG, IW9EKK. **IR4T**: I4UFH, I4JMY, I4YSS, IK4IEE, IK2SGC, IK2QEI. **J8ØR**: EA2CLU, EA2BP, EA2ADJ. **JA4EKO**: JO1DFG, JI1UTP, JA4EKO, JG4CLV, JR5JAQ. **JE6ZIH**: JR6GKT, JI6BRB, JK6SEW, JL6MPR. **JF1SQC**: JF1SQC, JK1PKS, JH8KYU. **JH7AFR**: JA7WME, JH7AFR, JH7DNO, JI7NUF. **JI2ZEY**: JA2BIV, JA2BHJ, JA2BIL, JM2CCL, JQ2BBC. **JN1YUU**: Saori & Chisa. **K1TO**: K1TO & K8MR. **K5TR**: W5KFT, KM5FA, K5TR. **K6ZM**: K6WG, UZ3AYR, WB6MZQ. **KC1F**: KC1F & PACKET. **KC7V**: KC7V, N7MB, N7TX, N7ZE. **KF9YT**: Club Group. **KI1G**: KI1G, K1NG, K1SD. **KL2A**: KL2A, KL7Y, WA2GO, WL7E. **KP2/WJ8C**: WJ8C & W7FKF. **KRØB**: NØBKL, KSØT, KJØB, KAØJZV, KBØKQA, AF9T. **KT3T**: KT3T & KT3O. **KT4W**: N4RV & KT4W. **KT6RA**: KT6RA & KD6KKP.

KU4BP: KU4BP, N4VHK, WB4MSG, NØKTY, WB4KQN. **LP4H**: LU2HQI, LU4HMF, LU9HPN, LU9HXQ, LW1HBV, LW5HBR, LW6HAR, LW9HAB, LW9HBU. **LT1F**: LU1FKR, LU3FZW, LU5CW. **LU3VAL**: LU2VDP, LU3UF, LU3VMS, LU8UE, LU8VDP, LU9VI. **LU6FBI**: LU1HF, LU6FAZ, LU6FBI. **LU7DCE**: LW8EZU & LW3DCE. **LX2LX**: LX2LX & LX1NO. **LX4B**: Club Group. **LX6T**: LX1SB & LX1KC. **LY2OM**: LY2OM, LY2BUU, LY2TX. **M8G**: GØLRY, GØUCS, GØUZF, GØWTD, GØWTM, G1HAM, G3ZRE, JIX & KF2ER. **N3VIA**: N3VIA & N3ZPE. **N4TO**: AE4SW, K4LQ, N4TO, WB4OSN. **N8DXR**: N8DXR & KB8YGP. **N9LYE**: N9LYE & N1ZRD. **N9THC**: N9THC & N9TZQ. **NA5B**: K5TT, W5AO, WØRRY, NA5B. **NE6N**: K6XC, KI7WX, W6ORD, W6AQ, W2CX, K6JYO, W6EEN. **NK7U**: NK7U & K7ZO. **NN6NN**: W6XK, NR6N, W6PS. **NP3P**: WP4NHM, KP2BH, KP3BE, NP3E, NP3H. **NR6R**: N6KI, 5B4WN, XE2Z, N6NC, WB6NBU, KR6NA, KF6NBH, W6MD, KM6XA, N6UZH, W5NYV.

NX5M: NX5M, N5XJ, KG5YA, N4GCA, N5LKC. **NY4T**: NY4T, KE4KMG, KD4ZFU, KR4FO, KF4SNZ, KF4GNV, KF4GFZ, KF4KAP. **OE1W**: OE1AKB, OE1AVC, OE1JNB, OE1PPA, OE1SOW, OE1TKW, OK3DZW, OE3KCC. **OG5F**: OH1JT, OH2HE, OH2IW, OH2JA, OH6CT, OH8KXK. **OHØW**: OH1EH, OH2XX, OH6EI. **OH5LF**: OH1WZ & OH5LF. **OH7AAC**: OH4XX, OH6LNI, OH7KIR, OH7MHL, OH7MS, OH7WV. **OK1KCF**: Club Group. **OK2KOD**: OK2BHM, OK2WAZ, OK2BDI, OK2BNX, OK2BJ. **OL5Q**: OK1FFU, OK1AYE, OK1FLC, OK1HDB, OK1HRA. **OL5T**: OK1TC, OK1DNR, OK1FLM, OK1HSK. **OM3KWZ**: OM7AC, OM7ARC, OM7CB, OM7AA, OM7AB, OM7ALH. **OM3Z**: OM3DX, OM8AW, OM8FF, OMØWR. **OM5M**: OM3BH, OM2RA, OM2KW. **OT8P**: ON4LAM, ON5OO, ON6AH, ON6VL, ON7LX, ON7PC, ON7ZV. **OZ5L**: OZ1KLC & OZ1KLD. **OZ7HAM**: OZ1ETA & OZ1BIZ. **OZ9KY**: OZ9AAR, OZ1EEZ, OZ1FKZ, OZ1DLD.

(Continued on page 86)

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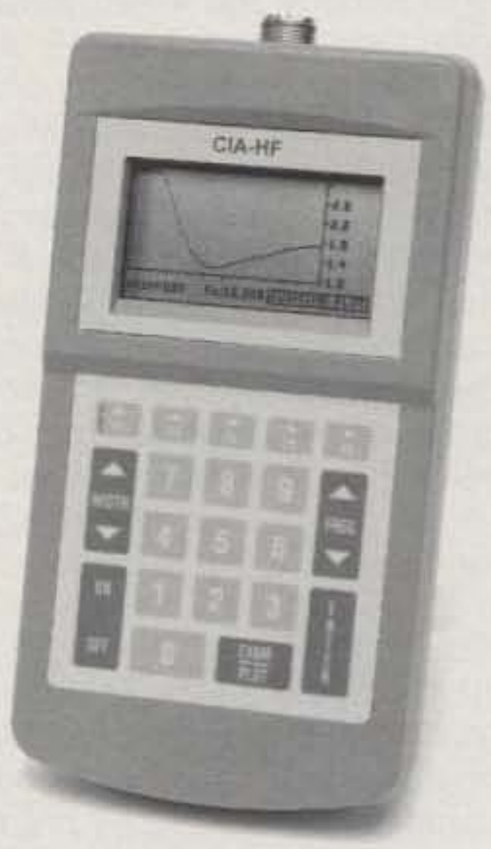

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You can put your enigma cypher machine back in the attic. VE3ERP has broken the code. With ease and alacrity you now can determine exactly what those wire gauges really mean.

Breaking The Secret A.W.G. Code!

BY GEORGE MURPHY*, VE3ERP

I would be the owner of the world's largest refrigerator if I had a free beer for every time I had to consult wire tables, the print sizes of which seem to vary inversely with my age. It has always bothered me that if I want some wire 0.0641 inch in diameter, I can't just order some 0.0641 inch wire. Instead I have to look up its A.W.G. (American Wire Gauge) code number, or someone quotes an A.W.G. number and I have to look it up before I know whether he is talking about lamp filaments or 500 amp power cable, or I find myself involved with B.S.W.G. (British Standard Wire Gauge), which has a different set of code numbers altogether. I much prefer the metric system where, oddly enough, wire 1.5 mm in diameter is referred to as 1.5 mm wire.

Goaded by frustration and by curiosity, I decided to compare A.W.G. and B.S.W.G. codes with the metric system to see if I could find out what these codes are trying to tell me. I did this by preparing a computer-generated graph (see fig. 1) using values which I looked up (as it turns out, for the last time![1]) in wire tables. The first thing I noticed on the graph was both systems appear to be chasing the same wild goose along closely adjacent paths. I have no idea where the goose is heading, but it is being closely followed by both systems.

The B.S.W.G. "curve" is actually a series of straight lines connected at the points indicated by dots, whereas the A.W.G. line is a true curve.[2] The B.S.W.G. "curve" appears to favor the philosophy of proceeding in a straight line until something isn't quite right, then changing direction a bit until things seem a little better and we can get back to our Tea.[3] On the other hand, a more reason-oriented philosophy seems to govern the A.W.G. curve; it exhibits a definite Newtonian flair, which indicates a modicum of logic in its creation.

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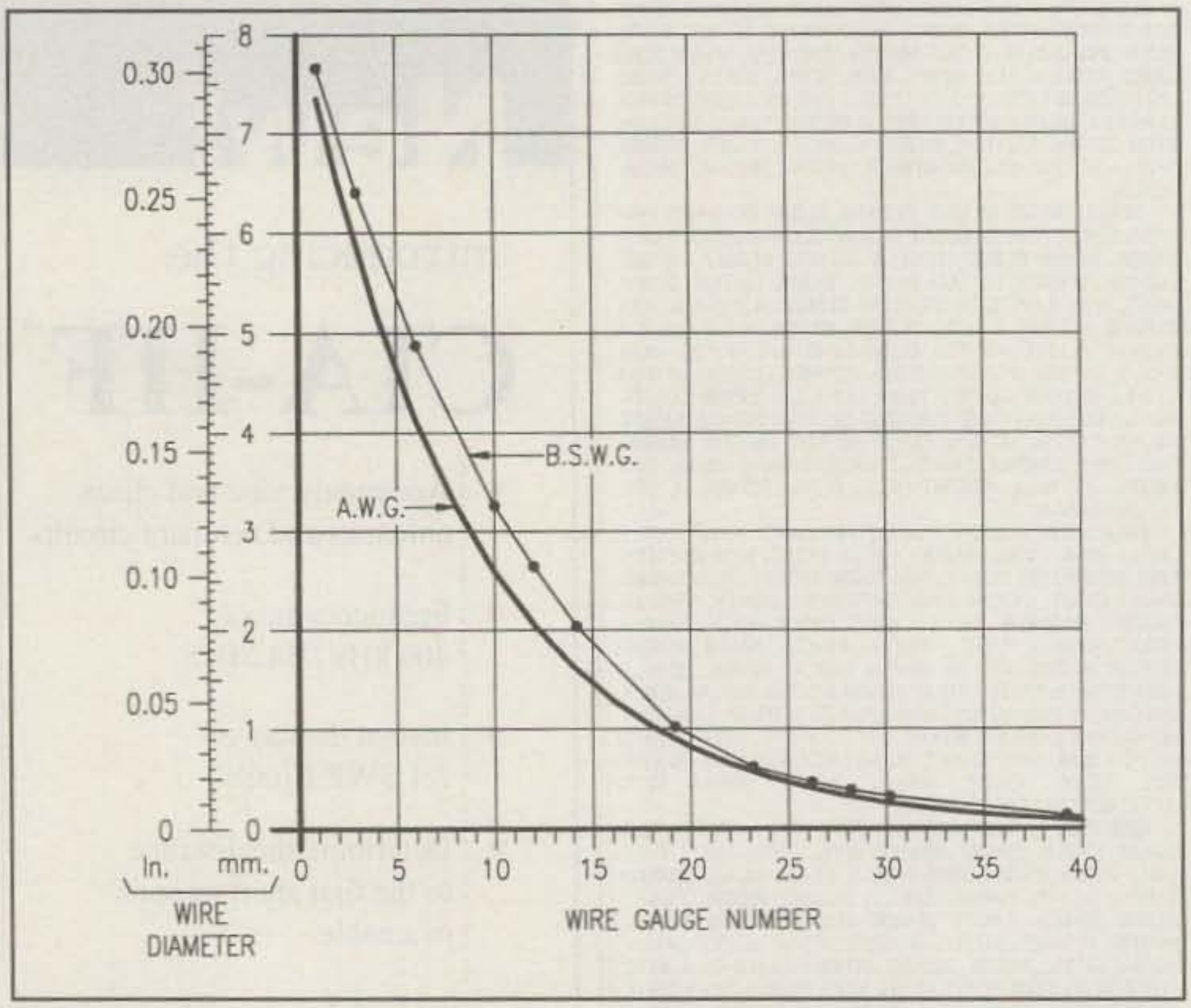

Fig. 1– A comparison of the American Wire Gauge and the British Standard Wire Gauge systems.

I could find nothing in my limited reference library about the origin of the American Wire Gauge system,[4] but it appears someone at some time decreed it would consist of 40 wire sizes ranging from 0.460 inch to 0.005 inch in diameter in an orderly mathematical progression from the largest to the smallest. The numbering system is a little strange, with the four largest sizes called #0000, #000, #00, and #0, then proceeding in arithmetic progression from #1 to #36 in incremental steps of 1. At some later date the range of sizes was apparently extended to AWG# 50.

With only this to go on, I devised the equations shown in Table I. The first thing I did was replace the multiple zero codes with values that can be used in an equation. In keeping with the progression of the rest of the code numbers, these values became –3, –2, and –1, respectively, resulting in an Equivalent Value progression of 40 numbers from –3 to +36. Since negative numbers are a nuisance to casual mathematicians like me, absolute numbers were assigned by adding 3 to each value in the Equivalent Value progression. This results in a 40 number Absolute Value progression from 0 to 39, which computers and calculators can munch with ease. From there on it only took a bit of high school math to concoct the equations shown in the table for calculating the

Say You Saw It In CQ

AMERICAN WIRE GAUGE EQUATIONS

Geometrical progression of 40 wire sizes from #0000 to #36 AWG. where:

#0000 = 0.460 in. (11.684 mm) diameter
#36 = 0.005 in. (0.127 mm) diameter

Arbitrary Code Numbers
#n = #0000, #000, #00, #0, #1, #2, . . .#36

Equivalent Values
n = –3, –2, –1, 0, +1, +2, . . .+36

Absolute Values
(n+3) = 0, 1, 2, 3, 4, 5, . . . 39

$$K = \frac{.46^{\frac{1}{39}}}{.005} = 1.122932$$

$$D_M = \frac{11.684}{K^{(n+3)}} \qquad D_I = \frac{.46}{K^{(n+3)}}$$

$$n_M = \frac{\log \frac{11.684}{D_M}}{\log K} - 3 \qquad n_I = \frac{\log \frac{.46}{D_I}}{\log K} - 3$$

where:

K = increment constant
D_M = wire diameter in millimeters
D_I = wire diameter in inches
n = A.W.G. code number
n_M = A.W.G. code of a wire sized in millimeters
n_I = A.W.G. code of a wire sized in inches

Table I– If you want to figure it out the hard way, use this system of equations. If not, it can be done simply on your computer.

diameter of a wire from its A.W.G. code, or to find the A.W.G. code of any diameter wire.

If you have a computer and *HAMCALC* software[5] (version 38 or later), you can let *HAMCALC*'s "Copper Wire Programs" option do all this math for you, plus a bunch of other neat stuff. For instance, did you know that B.S.W.G.#32 is actually A.W.G.#29.36589? Or that A.W.G.#70 wire, if it existed, would be 0.0001 inch diameter? You didn't? Shame on you!

Footnotes

1. I now use my computer to generate my own "Wire Tables" and do all the looking up and cross referencing between the three systems. More about this later.

2. The A.W.G. curve looks like something lovingly traced from *Playboy* magazine. The B.S.W.G. curve looks like something from the centerfold of *Popular Mechanics.*

3. Don't knock this philosophy. For centuries it got the British Royal Navy wherever it wanted to go.

4. I would appreciate hearing from anyone who knows the history of the A.W.G. system and how it originated.

5. *HAMCALC*, "Painless Math for Radio Amateurs" is *free* software containing more than 200 application and design programs. Written in GWBASIC, it requires a GWBASIC.EXE file in your computer, and runs in both MS-DOS and Windows. For a free 3 1/2 inch *HAMCALC* disc send US$5.00 (US$6.00 if you want a GWBASIC.EXE disc included) to the author at the address shown at the beginning of this article, to cover cost of production, packaging, and airmail postage anywhere in the world. ■

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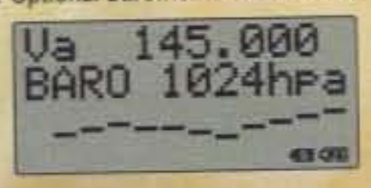

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- Spectra-Scope™ Graphical Display
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Most of us when we work a DXpedition give very little thought to the logistics of getting the people and equipment there on time, or what they have to go through to put that signal on the air. KJ9I lets us know what it was like to put T88II on the air and give a lot of us a new one.

T88II

DXpedition To The Republic of Palau

BY DAVID J. SCHMOCKER*, KJ9I

Since previous attempts to activate Palau had fallen on very difficult times,[1] we felt that extra planning, preparedness, and systems/equipment pre-testing were needed for our attempt on Palau.

Preparation: The Six P's

(Prior Planning Prevents Pretty Poor Performance)

Not only did we pre-assemble and color-code match-fit sections of the new 10, 12, 15, 17, and 20 meter Yagi in my Wisconsin driveway, we also pre-assembled and erected our military-style 8 meter aluminum guyed antenna support mast. Then we hooked up and pre-tested both transceivers with their respective linear amplifiers and all accessories with which they would be used.

Finally, we cross-tested components to simulate the scenario under which they would be configured should we experience any equipment failure(s). We prepared and RF tested all coaxial cables and jumpers also, testing for both solid mechanical and electrical construction as well as for VSWR on all amateur bands from 10 through 160 meters.

Let's Go!

The DXpedition formed as the operators (Rudy Verhoeven, NF9V; John Meyer, NZ9Z; and myself) met in Minneapolis, Minnesota, coming from our respective Wisconsin homes of Milwaukee, Kellnersville, and Oconomowoc. From Minneapolis, we flew to Palau (formerly Belau, Western Caroline Islands, KC6 prefix) via Tokyo-Narita, Guam, and Yap (Eastern Carolines, Micronesia).

Are We There Yet?

We were extremely pleased (and impressed) with how well things were going. Not only was every flight on schedule, but we arrived to find all our luggage had arrived safely at the proper destination. Luggage, radio, amplifier, unpacking, and inspection revealed that we had successfully transported in excess of 230 kg of sensitive electronic equipment with neither incident nor damage.

As we approached Palau, we were treated to an unexpected aerial tour of the island.

Just prior to final-landing approach on Palau, we were treated to a surprise fly-by of Palau by our 727 commercial flight crew (whose identity shall remain anonymous to prevent them from getting reprimanded for providing outstanding service). Without our asking, one of the flight attendants (whose home was Palau) asked the captain (pilot) to give us an aerial tour of Palau prior to landing. As the captain positioned the airplane to provide us

*N7298 County Trunk Highway F, Oconomowoc, WI 53066-9040

[1]"Disaster on Palau," The DX Magazine, *volume 09, issue 05 Sept./Oct. 1997.*

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> Less than 100 in/lbs mast torque @ 70 mph
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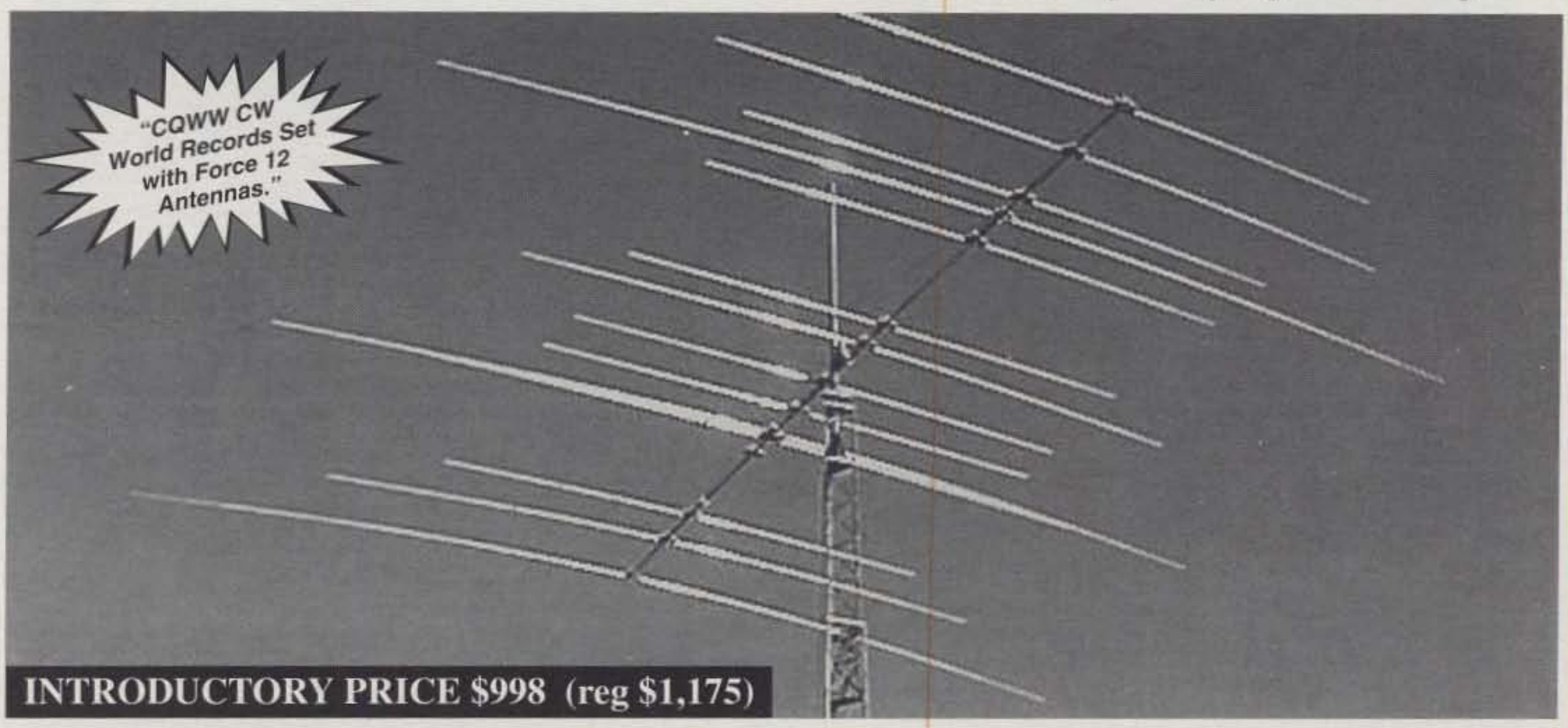
> Fast, "plug and play" assembly



The **C-31XR** is truly the next generation in tribanders; designed for maximum performance on 20-15-10 mtrs, plus strength, ease of assembly, low mast torque, side mounting and stacking. The **C-31XR** is 3 monoband Yagis overlaid on the same boom. There is a wide spaced 3el 20, a wide spaced 4el 15 and 7 elements for 10 mtrs. The gain target to beat was our own **C-3**, which was shown to have the most gain across 20 & 15 mtrs according to independent testing by K7LXC and NØAX. We did it! The **C-31XR** exceeds the C-3 by 1.4dB on 20, 1.5 on 15 and 3dB on 10 mtrs. F/B and side nulls are exactly what you would expect; excellent. There is nothing better than the **C-31XR**.

C-31R
31' boom, 14 elements, 85lbs, 10.5sqft, 100mph, 5KW, single feedline, no traps, all elements full size

CONGRATULATIONS!

6Y2A set a new Multi-Multi CW World Record using all Force 12 antennas, primarily verticals. This is especially impressive, as it is from a 2-point country, with 18,000 QSO's (on CW!!).
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CIRCLE 90 ON READER SERVICE CARD

The nerve center of our DXpedition, the new Koror Hotel. Once we got the electrical outlets rewired, we were in great shape.

with spectacular views, I vigorously exercised my 35mm camera to capture some of the spectacular beauty of this fascinating archipelago of over 360 islands.

Upon arrival at Palau, we were immediately stunned by the intense sauna-like heat and humidity of this tropical island. It was 35° C and humid (December is their cool season!). When I removed the protective cap from my camera lens to take a picture of the airplane, the lens immediately and completely steamed to zero visibility!

Troubled Bridge Over K-B Waters

At the airport we called for shuttle service from the airport to our hotel. Soon after leaving the airport, we saw the collapsed Koror-Babeldoab (K-B) bridge, the fate of which was well described in *The DX Magazine* piece footnoted at the beginning of this article. The K-B bridge, which had once linked these two islands, is now temporarily serviced by a pontoon-supported bridge to retain the lifeline link as permanent replacement of the K-B bridge is pending.

The author at the operating position of T88II.

Let's Get Ready to Rumble!

We set up both stations and had time between the frequent intense rain bursts and before sunset to erect a simple wire 40 meter dipole to put one barefoot station on the air. We made the first T88II QSO on 06 December 1998 at 09:19 UTC with JA7IIL.

Palauan Power *(How not to wire your own installation)*

The new pre-wired 234 volt AC outlets we placed in the hotel rooms had been improperly terminated with 117 volt rated receptacles! And a voltmeter check of the line-to-ground voltages on the 3-wire 117 volt outlets revealed reversed hot and neutral conductors (on all 117 volt outlets at the hotel) with a floating ground! Further electrical pre-inspection revealed fully exposed crimp-type connectors on the energized 234 volt hotel service entrance feeds atop the hotel roof within easy grabbing reach of unsuspecting people! Extreme caution had to be exercised at all times since safe and/or National Electrical Code compliant systems are not commonplace in Palau.

Further, when the electrician arrived to replace the 234 volt (117 volt rated) recep-

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Find your antenna's true resonant frequency. Trim dipoles and verticals.

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Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

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MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

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MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

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Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

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CIRCLE 66 ON READER SERVICE CARD

tacle with one of the proper voltage and current rating, he did so without first de-energizing the circuit! When I expressed concern to him about this practice, he casually informed me that he regularly works using such practices. I waited and watched in horror as he successfully completed the work without incident.

We then asked the electrician to properly ground the floating 117 volt receptacle ground in attempt to prevent smoked ham from occurring (due to difference in potential between transceiver and linear amplifier).

Now that we had the AC power situation in order, all we needed was to retrieve our pre-shipped cargo containing the antenna mast, coax, Yagi, and Battle Creek special antenna from the U.S. post office so we could complete the stations and move our operation to full strength.

Fanfare to the Common Ham

(Prior to going postal)

Rudy and I arrived at the Koror post office at 8 AM on Monday (the start of the business week). We planned to retrieve our 8 meter mast, multi-band Yagi, all of our high-quality RG-213/U coax, and the Battle Creek special low-band antenna, all of which had been shipped well in advance of our arrival on Palau.

Upon reaching the post office, I noticed two existing tri-band Yagi antennas atop a nearby multi-story building, the V.I.P. Guest Hotel, owned and operated by Mr. George Ngirarsaol, T88GN.

Despite being pre-shipped six weeks in advance with assurances by two separate U.S. postal employees of arrival in no more than ten days (and the assurance from former DXpeditioners that this method worked successfully), *none* of our four pre-shipped packages containing this mission-critical hardware had arrived!

Once Rudy brought me out of shock, we returned to the hotel to discuss our options and formulate possible solutions. First and foremost, we promised topband emphasis. In addition, we included 10 through 30 meter operation in our plans. To make good on our promise and deliver what we had planned, we first constructed a full-sized 160 meter dipole/inverted-Vee with an additional fan dipole element for 75/80 meters. We placed this antenna 7 meters above the flat concrete roof of New Koror Hotel, which has a down-looking view of saltwater in almost all directions and was pre-equipped with ample hardware to support the required structure. When the New Koror Hotel roof was insufficient to sprawl out the entire 160 meter half-wavelength wire, we engaged the loan of neighbors' palm trees as end supports to hold this simple, yet ultra-effective antenna. This antenna, which also played on other bands when used through our antenna tuner, proved to be the primary workhorse antenna from this (New Koror Hotel) location.

For our high-band station, we negotiated for the use of T88GN's V.I.P. guest hotel and antennas for 10, 15, and 20 meters at a station location roughly 1 km from the New Koror Hotel. Later we relocated the 40 meter dipole to the V.I.P. Guest Hotel location to reduce inter-station interference.

Bringing this dual-station system to operation afforded us coverage of all bands from diverse physical locations of adequate separation to eliminate the possibility of inter-station interference.

We made 13,500 QSOs during this op-

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eration on all nine bands from 10–160 meters. The final QSO was made with K9AW/DU6 on 18 December 1998 at 00:18 UTC.

During the expedition we regularly checked and adjusted our approach using available indicators to guide us. We listened to WWV to retrieve propagation conditions and forecasts, solar flux, and A and K indices. In addition, we relied heavily upon the highly useful Northern California DX Foundation (NCDXF) beacons at 14.100, 18.110, 21.200, and 24.930 MHz to determine band openings and maximize the efficiency/productivity of our operation.

Thank you to our sponsors, including the Northern California DX Foundation (NCDXF), Radio Society of Great Britain (RSGB), Chiltern DX Club (CDXC), German DX Foundation (GDXF), Alpha Power, Greater Milwaukee DX Association, Northeast Wisconsin DX Association, the Watertown (Wisconsin) Amateur Radio Club, the Battle Creek special team, and the thousands of you who directly and indirectly helped us succeed by supporting and working us. We hope you enjoyed the show. We look forward to the opportunity to serve you again.

On the return trip through Tokyo-Narita, we met Jim, JR1RCQ, (the 1989 VK9ZM Mellish Reef/VK9ZW Willis Island DXpedition), and Isao, JH1ROJ, (DXpeditioner extraordinaire) for lunch and discussing the topic we all love—DXing!

Topband Highlights

I was on topband faithfully from local sunset to local sunrise every night except one, when the A index was 32 and there were no signals coming through on 160 (I spent the remainder of that night on 75 meters with quick checks back to 160 in case the band opened). I transmitted on 1.8275 MHz listening up (by design) a full 7 kHz to prevent stations calling me from interfering with their local neighbors trying to hear my relatively weaker signal.

I had to dodge several fish-net locator buoys and found 1.834 MHz to be a quiet frequency most of the time.

For those 455 stations (mostly unique calls) we worked, our heartfelt congratulations. We personally share your pride! We worked as far east in North America as Florida and North Carolina.

For those 160 meter stations we were unable to work, I assure you we made a comprehensive topband effort. We worked all who were there and to whom we were blessed with band openings, however brief and spotty they often were!

To those who did not need us on top band and who stood by to allow others the opportunity, thank you for your consideration. You are the true gentlemen who make 160 meters the gentleman's band!

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CAROLINA WINDOM 160,	160 -10m, 252' Big Bang	$119.95
BigSig 40,	3/2 wave loop, 40 m, 110' A Sizzler	$69.00
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B1-5K	1:1	5 KW	160 -10 m	Precision	$31.95
B1-1KV	1:1	1 KW	15 - 2 m	VHF Current Balun	$25.95
Y1-5K	1:1	5 KW	160 -10 m	The YagiBalun™	$33.95
B4-1KXV	4:1	1 KW	15 - 2 m	VHF Current Balun	$29.95
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PL-259	Silver & Teflon	$1
RG-8X	Premium, 95%	13¢
RG-213	Mil-type, 95%+	33¢

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PL-259GT	Gold-Teflon, USA	$1.49 or $30/pk of 25
N/9913	For 9913, 9086, Flexi, etc.	$3.25
N/9913S	As above but Silver & Teflon	$4.25
N-200	'N' Silver-Teflon, installs like PL-259	$3.00
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RG-213	Top Quality, 95% (Sale on 100' or more)	33¢
ExtraFlex	Flexible, 9913 type	57¢
R1 Rotator	8 conductor (2 x #18, 6 x #24) SALE	26¢/20¢
R2 Rotator	8 conductor (2 x #16, 6 x #18) SALE	47¢/35¢
#14 HD	Stranded, 7 x 22 hard-drawn	8¢
#14 FlexWeave™	168-strand, bare for any wire ant.	14¢
#12 FlexWeave™	259-strand, excellent for longer runs	19¢
450 Ladder	#16 stranded cond, windows SALE	22¢/16¢
450 Ladder	New! #14 stranded cond. poly SALE	30¢/24¢
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MODIFICATION

The measure of a well-accepted piece of equipment is the number of modifications you're willing to do to it rather than simply buying something else. W5IIQ shows us how to make a good product even better.

How To Add RF Gain Control To The Ten-Tec Scout

BY LAURENCE P. WILLIAMS*, W5IIQ

The Ten-Tec Scout radio is a very neat radio which offers many great performance features for a modest price. It is a straightforward design without many of the present-day computer-controlled functions. That's why I appreciate the Scout. It's easy to use.

In the initial design phase of the Scout, there was a limitation due to the size and space that restricted the number of front-panel controls available. As I understand it, a survey was conducted among prospective Scout users, ranking the importance of each operator control in the new design.

After reviewing the results from the survey, the folks at Ten-Tec decided the RF Gain control had to go. As a result, the Scout operates with a fixed, RF Gain level at maximum.

As with any decision, if you get something, you lose something; every decision is a compromise. In my case, I felt the loss of an RF Gain control was too much of a compromise. When the receiver operates at full RF gain, (in my opinion) the noise floor is compressed against the maximum sensitivity level of the unit, which greatly reduces the audio signal-to-noise ratio, especially on the lower bands where the average atmospheric noise is near the maximum receive level of the receiver. In my case, I felt the need for an RF Gain control would greatly improve receiver performance particularly when operating on bands where the signal strength is enough to allow reduction of the RF sensitivity of the receiver to improve the audio signal-to-noise ratio.

After due thought, I arrived at a method to include an outboard RF Gain control that:

1. Did not require any disassembly of the Scout to install, except the removal of the bottom cover.

2. Required cutting of one printed circuit run (accessible) and installing an isolation diode across the bridge

3. Installing a 1/8 inch miniature stereo jack and two-wire shielded cable on the bottom sub-chassis and the connection of two wires to the bottom of the IF Audio Board.

4. Centering and drilling an access hole through the bottom cover to allow mating of the stereo plug with the stereo jack mounted on the sub-chassis.

5. Building an RF Gain control circuit in a remote enclosure connected to the Scout via a two-wire shielded cable and a miniature stereo plug.

6. To allow the Scout to revert to the factory AGC design operation when the external RF Gain unit is unplugged.

Fig. 1– Notice anything missing? Yes, you're right! There's no RF gain control.

(**Note:** The writer assumes no responsibility for equipment modification.)

Instructions

Remove the bottom cover of the Scout by removing the four retaining screws.

Caution: In order to protect the built-in speaker when handling the Scout, replace the four retaining screws, leaving the top cover in place.

Removal of the bottom Scout cover allows access to the IF Audio circuit board printed runs. The IF Audio board (with printed circuit runs) is located forward, near the front panel.

The printed circuit run that is to be cut and the two connection points must be located on the circuit board. See figs. 2 and 3. The connection points are:

1. AGC buss output from the emitter of

*111 Bradford Circle, Ocean Springs, MS 39564-3901

Say You Saw It In CQ

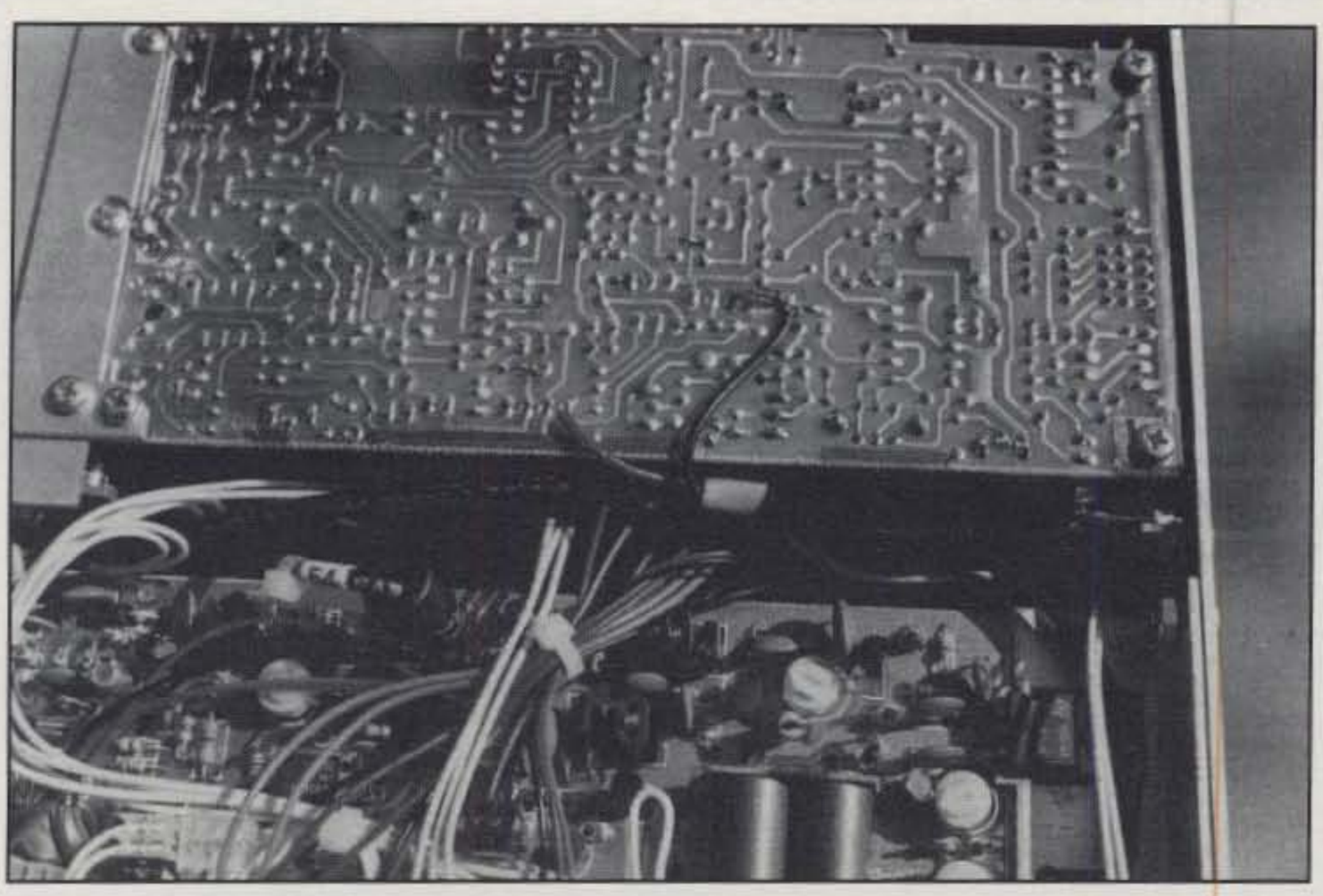

Fig. 2– Printed circuit runs on the bottom of the IF audio board.

Q5. *Note:* After installation of the isolation diode (1N4148), the opposite end of the diode connected to Q5 is the external connection point.

2. + R Voltage (P9)

With the Scout operating, use a voltmeter to verify the correct connection points on the IF Audio board. The AGC buss can be verified by observing fluctuating positive voltage which follows the S meter. Note the location. The collector of Q5 is the far right connection on the bus, while R11, R15, and R 80 are the three connections on the far left of the bus (with the front of the Scout facing the viewer).

The printed circuit run (between) the collector of Q5 and the connection points of R11, R15, and R80 must be cut. A diode, D1 (1N4148), is then installed with the plate (arrow) connected to the emitter of Q5, and the cathode (bar) is connected to the junction of R11, R15, and R80 (the external connection point). This change alone greatly smoothes the AGC action.

The + R voltage (+10.0 V) is one of the two pins on connector 9. Using the voltmeter, locate this point by keying the Scout from receive to transmit, and vice versa. The + R voltage exists only in the receive mode of operation. Note the location.

Caution: Extreme care should be exercised not to allow the drill bit to protrude beyond the new hole in order prevent damage to existing Scout components.

Refer to fig. 3 and notice the location of the miniature stereo jack, the isolation diode, the wire connection to the AGC buss, and the + R voltage connection. Position the stereo jack just behind the IF Audio board on the left side of the Scout. Drill an appropriate hole for mounting.

Solder the two wires plus the shield to

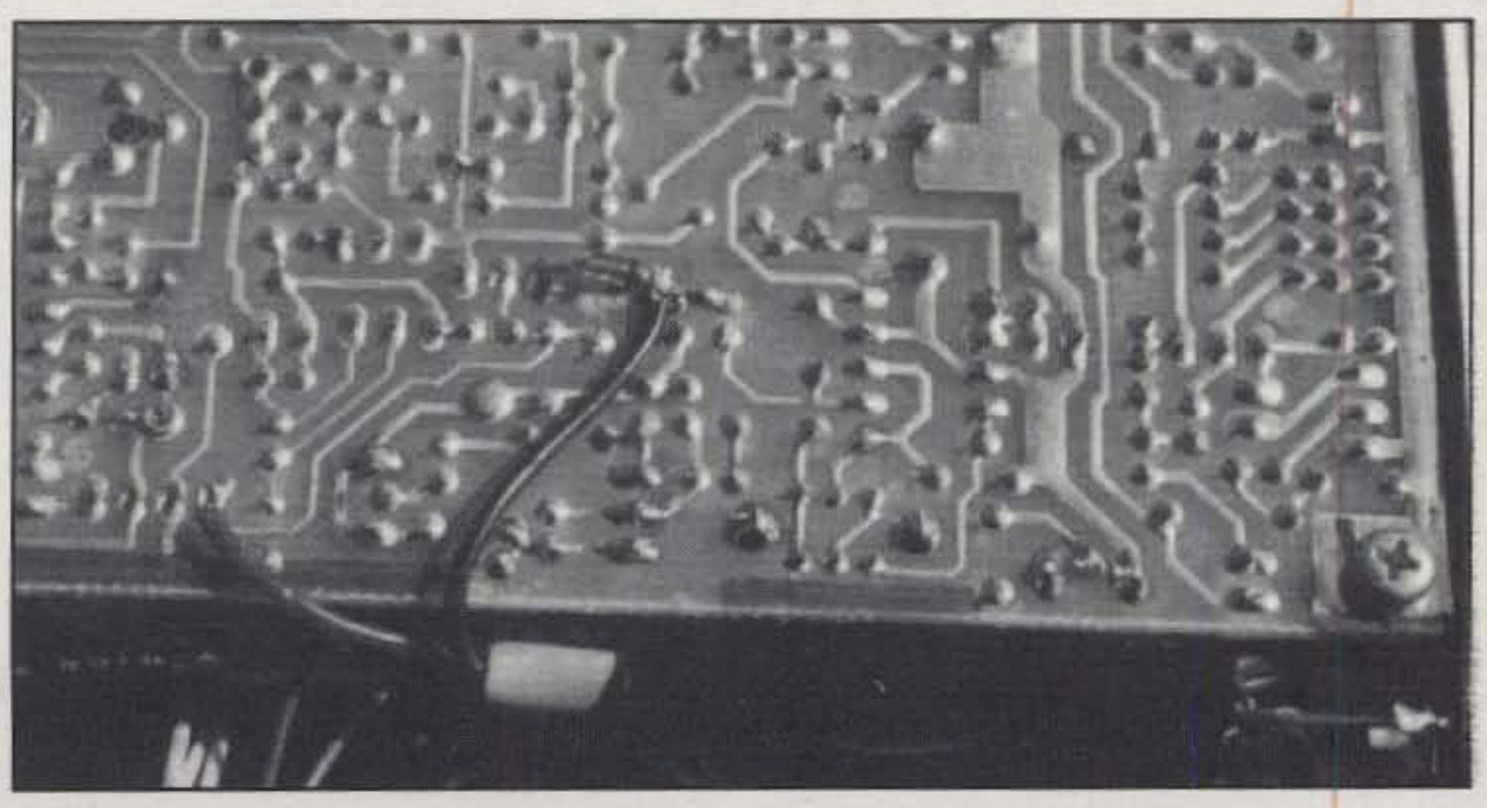

Fig. 3– Connections to IF audio board are made here.

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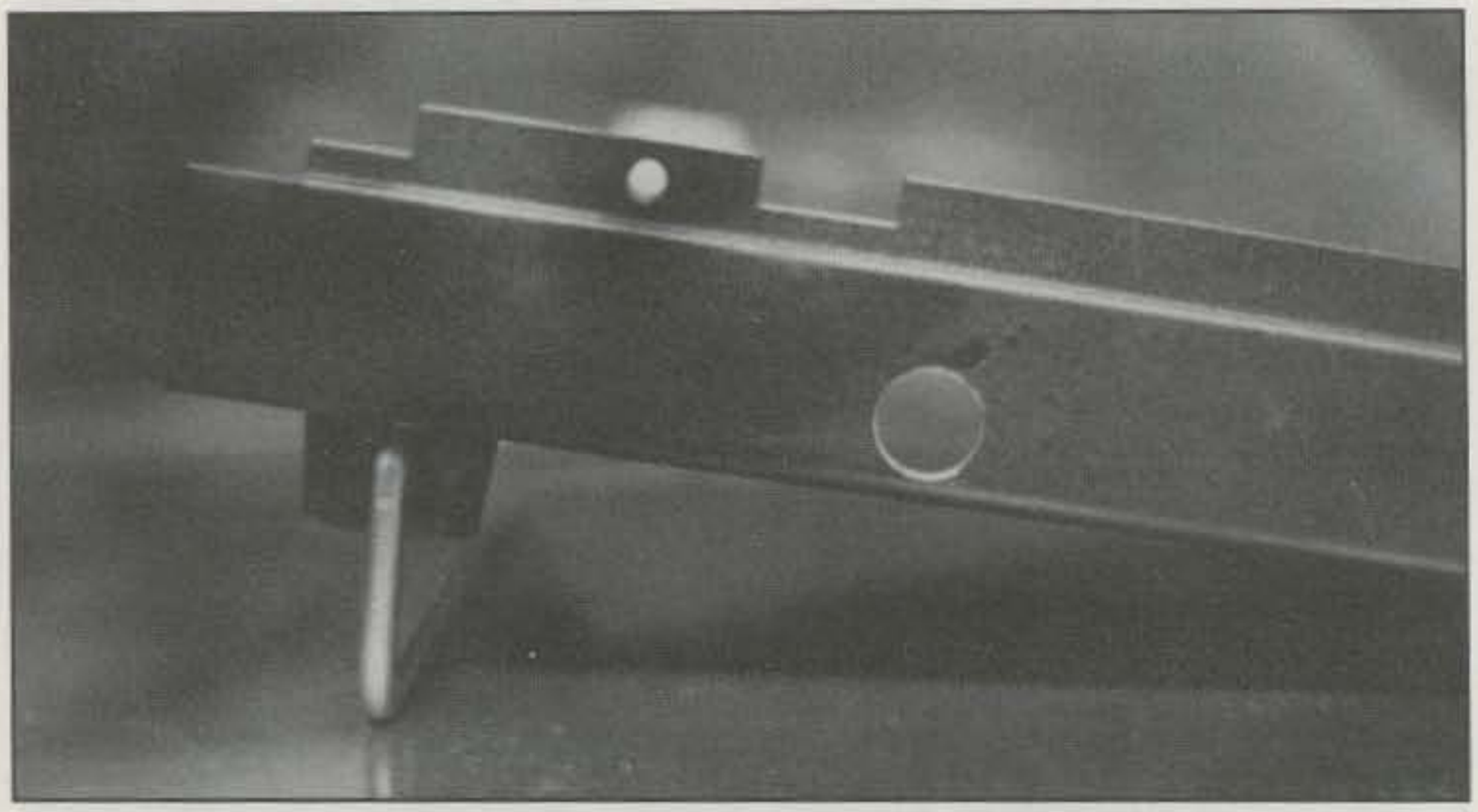

Fig. 4– The Ten-Tec Scout bottom cover access hole for stereo plug.

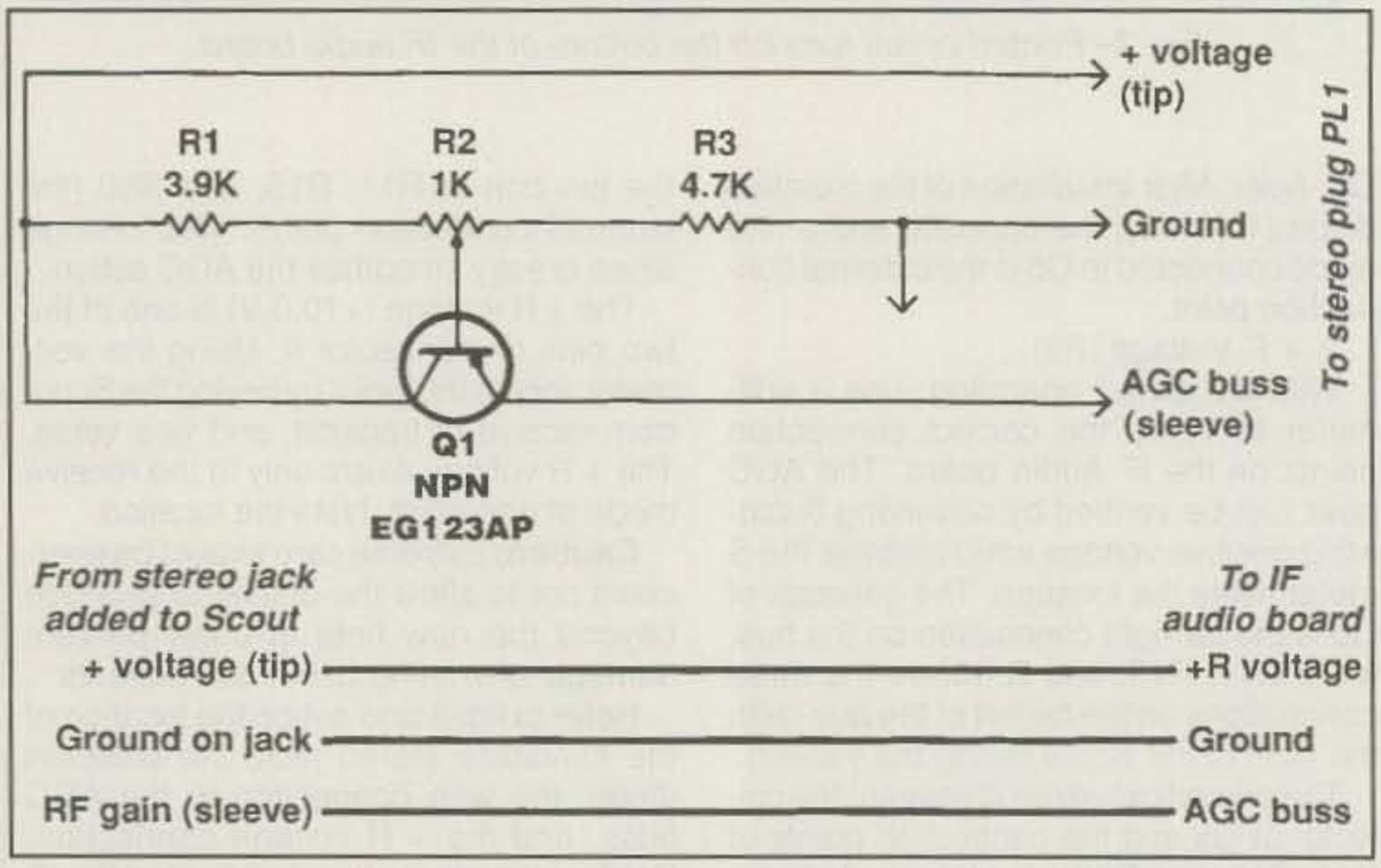

Fig. 5– Schematic diagram for the RF gain control modifications, as described in the text.

Parts List

Source: Mouser Electronics, 958 North Main Street, Mansfield, TX 76083 (1-800-346-6873).
Q1: NPN Transistor (526-NTE123AP)
R2: Potentiometer, 1K linear taper or equivalent (31VA301)

Source: Radio Shack
D1: Diode, 1N4148 (276-1122)
R1: Resistor, fixed 1/4 watt, 3.9K (RSU11344975)
R3: Resistor, fixed 1/4 watt, 4.7K (271-1330)
PL1: Stereo Plug, 3-cond 1/8 inch, mini-size (274-284)
J1: Stereo Jack, 3-cond 1/8 inch, enclosed, open circuit (274-249)

Table I– Parts list and sources for modification components.

the stereo jack (Note: The + R voltage should connect to the tip and the AGC Line should connect to the sleeve of the jack.) and mount. The shield can extend down the wiring assembly but does not attach to the IF Audio board. The wires should be about 6 inches long to allow trimming to the proper length when attaching to the IF Audio board.

Note: Care should be exercised not to

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Fig. 6– The outboard unit that houses the RF Gain control.

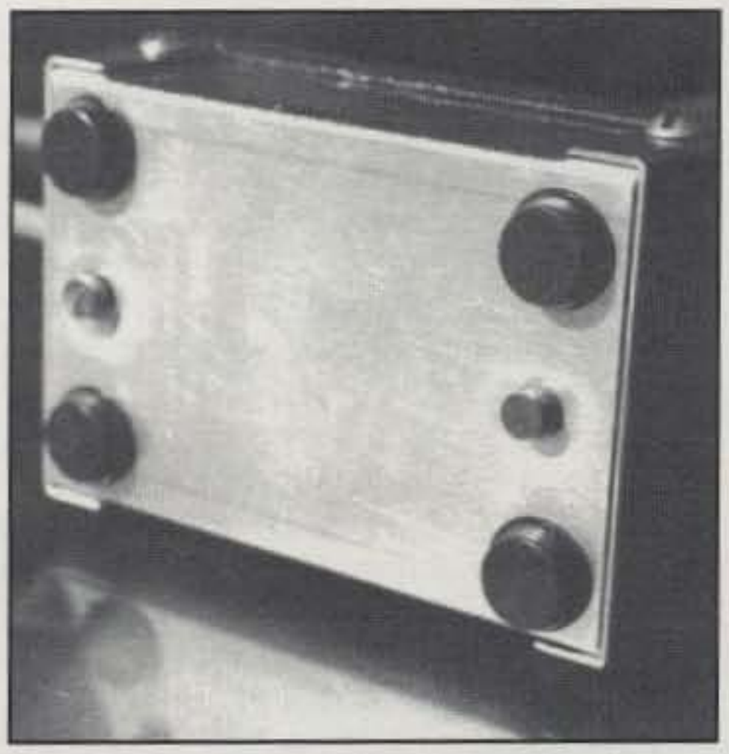

Fig. 7– The RF Gain control enclosure mounting scheme.

overheat the circuit runs when making connections. Otherwise the circuit board can be permanently damaged.

Trim to length and connect the wire connected to the tip to the + R voltage point on the IF Audio board. Trim to length and connect the wire connected to the sleeve to the AGC point on the F Audio board.

Measure the position of the new stereo jack and drill a hole in the bottom cover appropriate to accommodate access to the stereo jack by the external stereo plug. If a mobile mount is used, position the location of the bottom cover hole in the mobile bracket and drill an access hole to allow access through the mobile bracket. See fig. 4. Replace the bottom cover on the Scout.

Use a two-wire shielded cable to connect to the 1/8 inch stereo plug, using the same + R voltage to the tip and AGC to the sleeve of the plug. The RF Gain circuit is shown in fig. 5. The resourcefulness of the builder is now at hand. The circuit is basic and can be easily built without difficulty, just as long as the enclosure is shielded.

One might miniaturize the RF Gain components in order to allow a convenient location. The unit that I built is for fixed station operation, so it is fairly large. It sits in a handy place on the operating desk. See fig. 6 for my version of the RF Gain control.

A Little Extra

Mounting of the RF Gain enclosure box is accomplished by magnets which allow placement of RF Gain control in any convenient location. Only a ferrous mounting surface such as the case of the Scout is required. Two sets of powerful rare earth magnets (Radio Shack catalog No. 64-1895) are glued to the bottom of the R. Gain control enclosure to provide the necessary holding power to keep the enclosure in place, fig. 7. Notice the four vinyl mounting feet which are slightly taller than the magnet assemblies.

With the two magnets (two per set) glued to the bottom of the enclosure, a 1/16th inch spacing to the mounting surface prevents actual magnet contact. Therefore, the vinyl feet provide the only physical contact area of the mounting surface, which prevents surface scratching. The strength of the rare earth magnets are more than ample to hold the enclosure in place. ■

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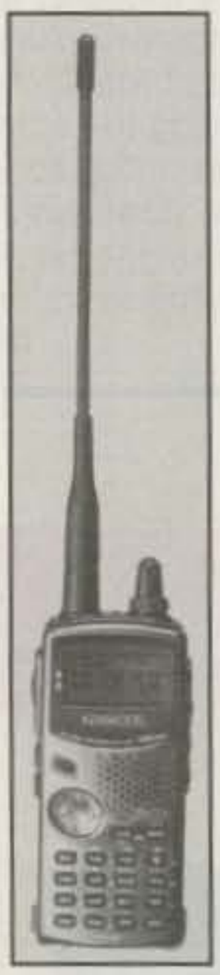

There's an automatic grid square calculator built in (as long as you or your GPS receiver knows your latitude and longitude). Plus, you can use the keypad to type brief messages for APRS or other packet transmissions, and you can store received APRS information in up to 40 memory channels. There's a standard computer port for packet operating or for viewing APRS data on a map. The TH-D7A is compatible with Kenwood's VC-H1 Visual Communicator and provides the capability to add your callsign, signal report, or any other brief text message to a slow-scan image generated by the VC-H1. If you have a Kenwood HF rig, such as a TS-570S or TS-870S and the right interface, you can remotely control your HF rig with the TH-D7A.

List price for the TH-D7A is expected to be under $500. For more information, contact Kenwood Amateur Products Group, P.O. Box 22745, 2201 E. Dominguez St., Long Beach, CA 90801-5745 (310-639-5300; Internet: <http://www.kenwood.net>), or circle number 104 on the reader service card.

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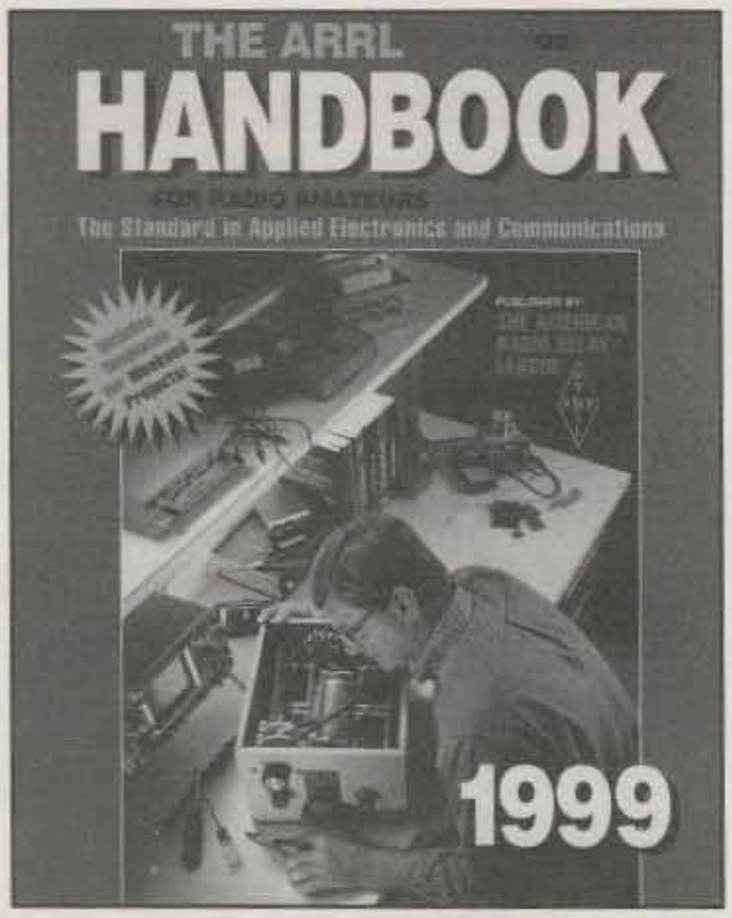
1999 *ARRL Handbook*

The American Radio Relay League has released the 1999 edition of *The ARRL Handbook for Radio Amateurs*, the 76th edition of this standard electronics reference book. The 1200-page *Handbook* is revised and updated annually and offers clear, thorough explanations of electronics and communications theory, projects for all levels of building experience, and important reference material. New features for 1999 include a 13.8 volt/40 amp switching power supply project, a Voice Keyer project, and templates for weekend projects. In addition, some of the *Handbook* software (available for free download from the ARRL Web site) has been enhanced.



The 1999 *ARRL Handbook for Radio Amateurs* retails for $32. Copies are available from amateur radio dealers or ARRL Publication Sales (ARRL order no. 1816), 225 Main St., Newington, CT 06111-1494 (toll-free 888-277-5289; fax 860-594-0303; Internet <http://www.arrl.org/>). When ordering from the ARRL, include $6 for UPS shipping. For more information, circle 106 on the reader service card.

Jensen Toolkit and Meters

Jensen Tools of Phoenix, Arizona, has introduced a connector repair/installation kit, the JTK-3200, which contains 27 tools needed to cut, strip, and crimp cable connectors and terminal ends. The kit is designed for D-sub, circular, coax connectors, and ring terminals. In addition, Jensen is offering a new line of digital multimeters, ranging from the full-featured JTM-105, a true-RMS meter, to the JTM-63, a low-cost pocket meter.

For more information, request a copy of the current Jensen Tools catalog from Jensen Tools, 7815 S. 46th St., Phoenix, AZ 85044 (800-426-1194 or 602-968-6231; fax 800-366-9662 or 602-438-1690; Technical Faxback Service 602-453-2671; or on Internet: <http://www.jensentools.com>), or circle number 107 on the reader service card.

ICOM IC-R2 Handheld Receiver

The new ICOM IC-R2 handheld communications receiver will let you listen in on virtually everything (except cellular frequencies, of course) between 500 kHz and 1.3 GHz. That includes every amateur band from 160 meters through 23 cm; every shortwave broadcast band; every public safety band; AM, FM, and TV broadcast bands; and whatever else is in between. It listens in AM (*but not SSB—ed.*), FM, or wide FM, features eight banks of 50 memory channels (400 total), large front-panel controls for easy operation, CTCSS tone search and de-code, multiple scanning functions and tuning steps, an attenuator, a noise blanker, and more.

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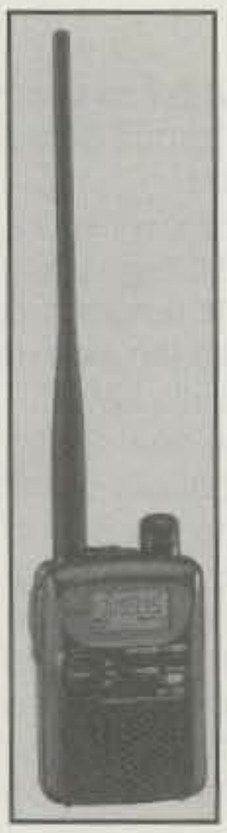

List price for the ICOM IC-R2 is $244. For more info, contact ICOM America, Inc., 2380 116th Ave., NE, Bellevue, WA 98004 (425-450-6088; on Web: <http:// www.icomamerica.com>, or circle number 108 on the reader service card.

PkTerm '99 for Windows

PkTerm '99 from Timewave Technology and Creative Services Software, a

new 32-bit Windows® terminal program for Timewave TNCs, is now available for "preview." This program takes advantage of the new features in Windows 95/98 and Windows NT, and integrates these features with the "Host Mode" of the Timewave wireless modems (TNCs). PkTerm '99 requires Windows 95, Windows 98, or Windows NT with at least 8 MB of RAM and 6 MB of free hard-drive space. The program supports Com1 through Com35 and has "point and click" commands for the VHF and HF modes that the Timewave TNCs support. The program is written in robust C++, using the Microsoft Foundation Class Library.

This preview version of PkTerm '99 has been in beta test since last August. Purchasing the preview version will allow the user to upgrade to the release version at no additional cost. PkTerm '99's suggested retail price is $69.95; it is available directly from Timewave. For more information, contact Timewave Technology, Inc., 58 Plato Blvd. East, St. Paul, MN 55107 (651-222-4858; fax 651-222-4861; e-mail: <sales@timewave.com>), or circle number 109 on the reader service card.

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CIRCLE 41 ON READER SERVICE CARD

BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

An Inexpensive Charger for Lithium-Ion Batteries

As we get ready for the warmer weather and dust off our portable equipment, the subject of batteries always comes to mind. But before rushing out to replace those Ni-Cads, zinc-carbons, and alkaline power sources, consider the latest.

As some of you may be aware, the newest rechargeable battery on the scene is the one using lithium-ion technology. This battery offers performance superior to the common nickel-cadmium type, since it does not have a "memory" and can be trickle charged continuously. You never have to "deep discharge" or recondition these devices, and even disposal is safe for the environment. Furthermore, individual lithium-ion cells provide 3 to 4.1 volts, which is much closer to the voltages needed by modern integrated circuits (such as the emerging 3.6 volt devices) than 1.2 volt Ni-Cads or 1.5 volt zinc-carbons. There is a small problem, however. Lithium-ion batteries are somewhat difficult to charge, since they require a constant current/constant voltage circuit that is quite different from their Ni-Cad counterparts. Fortunately, Linear Technologies has made the job much easier with a new chip, which we describe this month.

c/o CQ magazine

The device we are referring to is the LTC1541. This chip, as shown in fig. 1, contains a precision voltage reference, comparator, and op amp which can be easily and inexpensively interconnected to form a complete lithium-ion charger, as we soon will see. It comes in an 8-pin package and contains no real surprises. The reference, by the way, is accurate to ±0.4% and the chip can be used for other applications needing these components as well.

The complete lithium-ion battery charger/input power supply is shown in fig. 2. In operation, the 2N2907 controls the battery charging current. It is driven by the output of the internal op-amp via the 2N3906. Since this portion of the circuit operates in a linear mode, the 2N2907 will dissipate up to 1 watt and should be adequately heatsunk. The 0.15 ohm resistor senses battery charging current and feeds it to the positive op-amp input via pin 3. The internal reference is divided to 44 millivolts by the 100K and 3.83K resistors and applied to the negative or inverting input. The difference between the two drives the 2N2907 to produce 300 ma of charging current. At the same time, the divided bat-

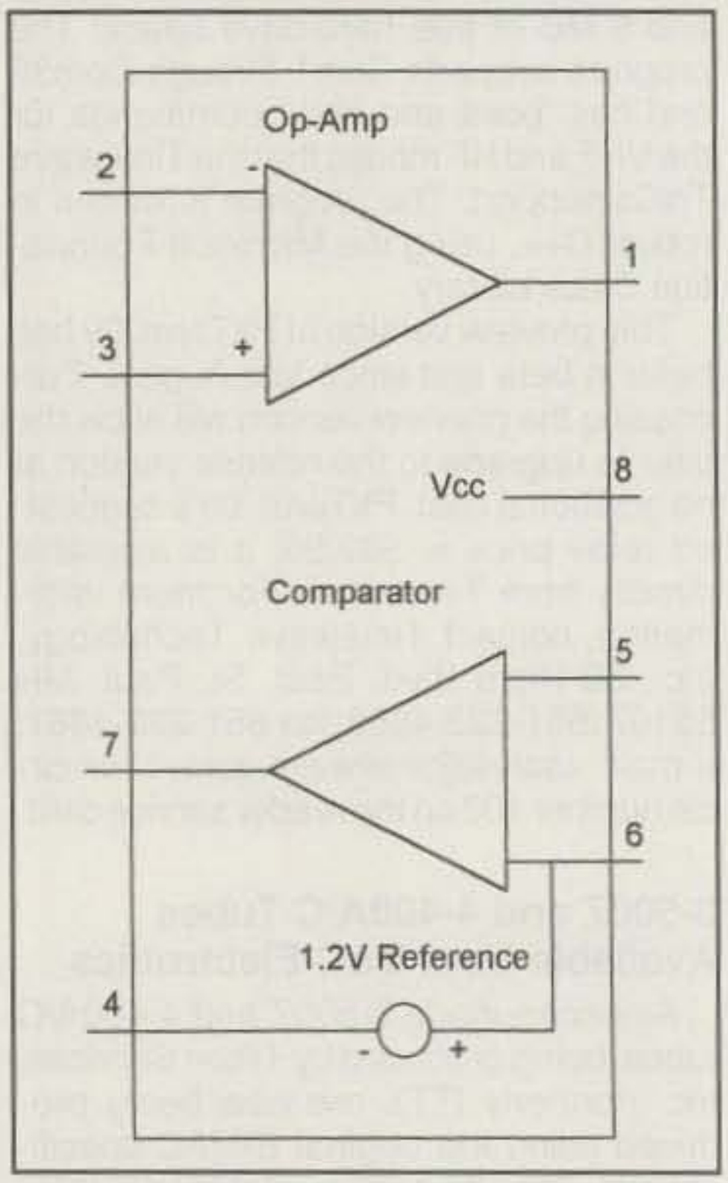

Fig. 1– Internal block diagram of the LTC1541.

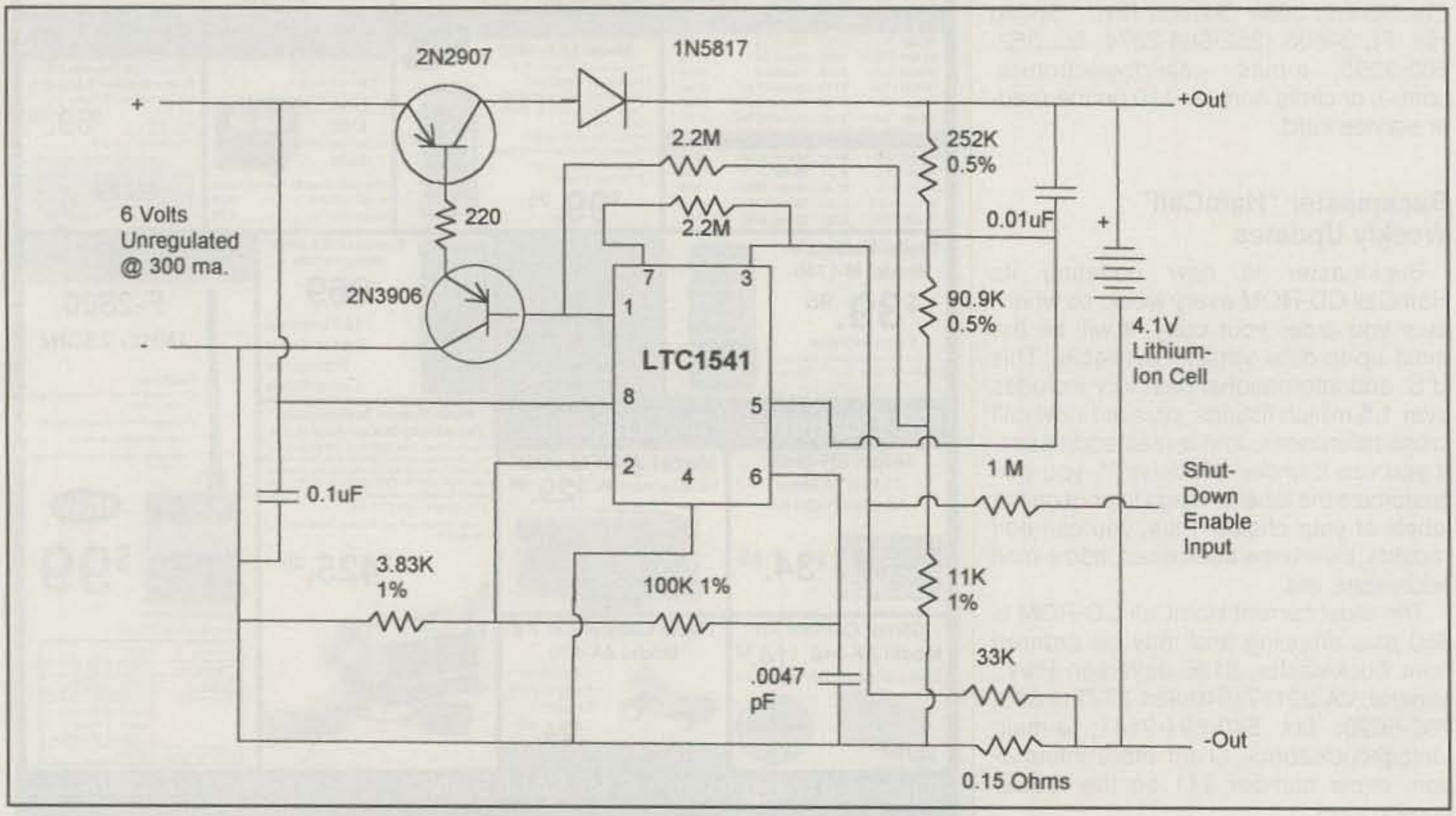

Fig. 2– Complete lithium-ion battery charger circuit.

Say You Saw It In CQ

tery voltage present at the junction of the 252K and 90.0K resistor is applied to the positive comparator input at pin 5. This is compared to the reference (internally connected to pin 6), and when 4.1 volts is reached, shuts down the linear regulator by controlling the op-amp via pin 3. A shutdown input is also provided to turn off the LTC1541 when the charging function is not required. This can be used to reduce current drawn by the chip when the battery is being used to power the external circuit.

Since both charging current and voltage are regulated by this circuit, the unregulated 6 volt input source is not critical and can come from a wall-type adapter. If the battery is also connected to the external circuitry it will power, the circuit will share the current. This means that with no external load, all current will be used to charge the battery. With some external load, the battery charging current will reduce in proportion to the current drawn by the load. In this way the circuit can be used to both charge the battery and power external circuitry at the same time. Now you can have an AC line powered device (via the wall adapter) which continues to operate in the event of a power failure. Pretty neat stuff!

If you require more information on this device, contact Linear Technologies at 1630 McCarthy Blvd., Milpitas, CA 95035-7417 (1-800-4-LINEAR, or on the web at <www.linear-tech.com>).

73, Irwin, WA2NDM

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It's probably too late to catch a 2.7 million dollar baseball, but serendipity comes in all forms. All you have to do is be in the right place at the right time.

"Pardon me, boys. Is that the Cedar Rapids Speed Key?"

BY ROBERT M. MAY, II*, K4SE

As my XYL, Carol, and I entered the cavernous hall, she reminded me that we had just over two hours before we had to catch a train. Two hundred tables to inspect with no time to spare! I asked her to remind me when it was nearly time to leave.

How does one look at all those goodies with that kind of pressure? I decided that Carol would keep the pace. She *knows* how I am at one of these events. Whenever I spent more than a couple of minutes looking over this or that at one table, she pulled me on to the next.

Just as I was craning my neck to catch the last few items at one particular table, I *had* to stop to look at one of the most interesting "bugs" I had ever seen. It was old, yet it was new. It was still in a very shop-worn box, but it looked as though it had never been used. The price was right, but I remembered that there were many more tables I hadn't seen yet. So, Carol, you were right. We had to keep moving.

Oh, there was the usual array of goodies—brand spanking new stuff and relics from the past. Some of the items were reasonably priced, while one wondered if some of the sellers really wanted to part with much of the other stuff. But I couldn't get my mind off that bug. Did another person find it and buy it? Wasn't that someone over there right now negotiating?

Finally, Carol said, "Time to go!" On the way out I picked my exit to pass by "that table." The bug was still there!

One never goes to these events and pays the asked-for price, but there wasn't time to do any serious negotiating. To the

The best thing for an amateur? It still has the original box. A great find in an unexpected place makes an even better addition to the shack.

The underside of this Cedar Rapids key still has the original paper tag with mounting suggestion and sales pitch.

*P.O. Box 453, Jonesboro, TN 37659

Say You Saw It In CQ

man behind the table I said with some urgency, "I'll make you a firm offer of (about 80% of the asking price) for the bug, and I've got to catch a train in less than 30 minutes."

Much to my surprise, he handed me the key and took the money. the bug was mine!

The train arrived as scheduled and we boarded on time.

After we got home, I just had to research what I had bought. The box describes my key as "Telegraph Vibrating Speed Key, Made in U.S.A., Electric Specialty manufacturing Co., Cedar Rapids, Iowa." The box is also adorned with "circle CR's"—probably for Cedar Rapids. The company name is cast into the very heavy iron base, but there is no serial number or other identification on the key. There are *five* rubber feet on the bottom, with a red tag screwed under the larger center pendulum-end foot imprinted: "This foot can be removed if 3-point mounting is not wanted. If this key suits you tell your friends about it."

Searching the Internet, I found the very interesting web site of Neal McEwan, K5RW. Judging from the extent of his page, he must have one of the most extensive key collections in the world. Neal e-mailed me that my key is known as the "cedar rapids" bug. These were made from 1939 to about 1950, and they were the only ones ever offered in kit form. He also commented that it was nice to find one still in the box.

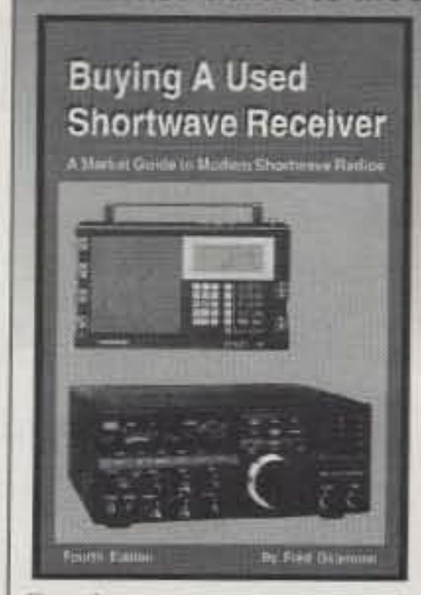
In the October 1940 issue of *QST* magazine I found a small advertisement for this key stating that one could indeed then order a "radio type" in kit form for $2.89! Mine is a "radio type" which has no shorting switch. The land telegraph type has the shorting switch as shown in the *QST* advertisement.

Of course, I had to put the bug on the air. It has a very nice, smooth feel to it. The long pendulum with two *different* size weights allows it to QRS slower than a stock Vibroplex Original. It QRQ's nicely, too. If it had ever been on the air before, it wasn't used very much. It is entirely possible that I am the first person ever to send a signal with this "new" key that could very well be 60 years old!

I didn't find my "Cedar Rapids" bug at a hamfest, but at a train and railroadiana show in Chattanooga, Tennessee. The show ran concurrently with the 1998 Southern Railway Historical Association Convention. And the train we caught was a special excursion on former Central of Georgia tracks between Chattanooga and Chickamagua, Georgia, behind the famous ex-Southern Railway Mikado 2-8-2 steam engine 4501. ■

Buying A Used Shortwave Receiver

A Market Guide to Modern S.W. Radios



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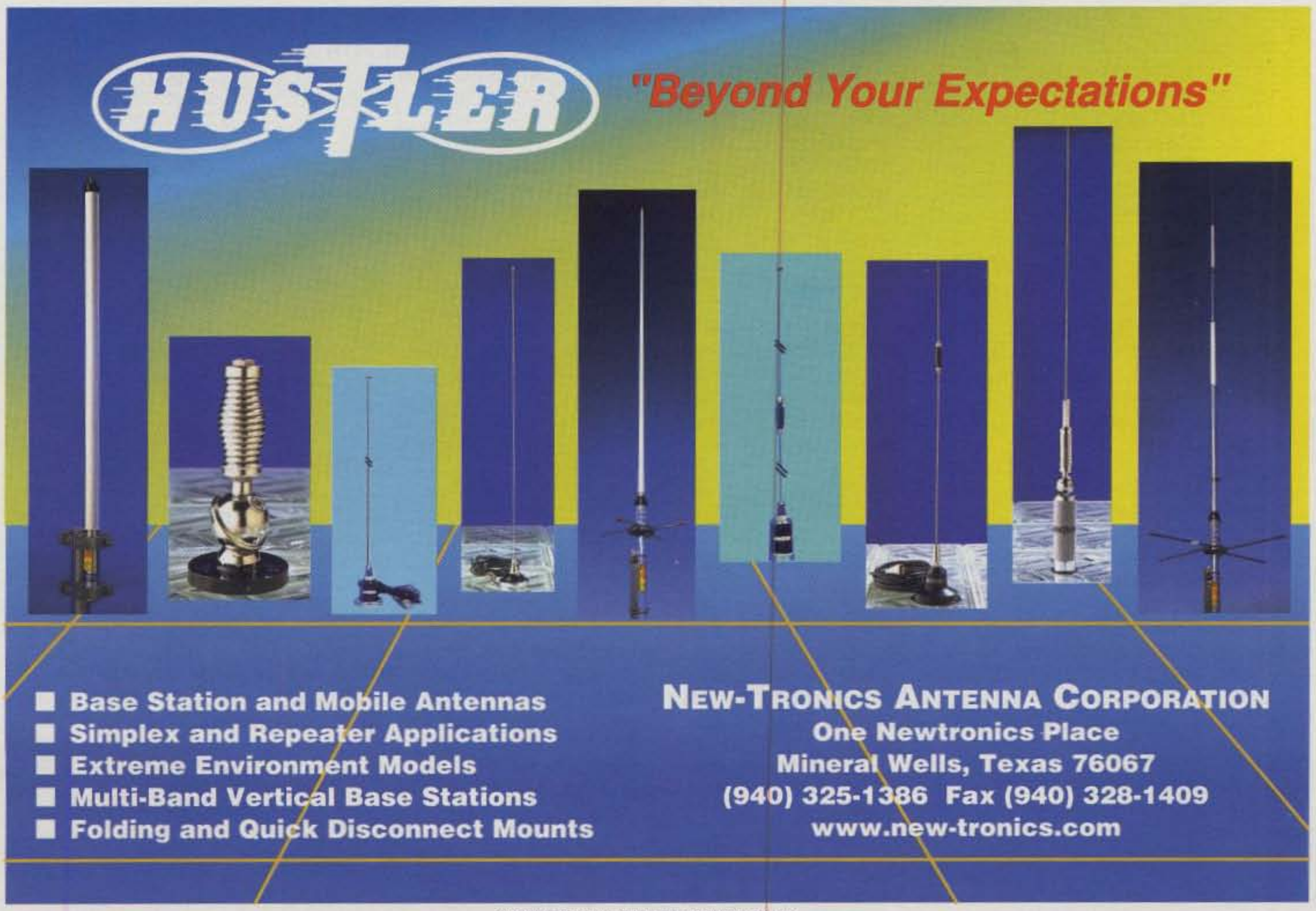

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WORLD RECORD HOLDERS

SINGLE OPERATOR

1.8	LY6K('98)	481,164	303
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	ZX9A('97)	10,787,128	814
14	EA8AH('97)	11,142,198	981
21	ZW5B('95)	14,095,142	1054
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060
QRP/p	HC8A('94)	7,520,562	714

MULTI-OPERATOR SINGLE TRANSMITTER

HC8A('93)	32,502,677	1107

MULTI-OPERATOR MULTI-TRANSMITTER

ED8ACH('91)	47,278,236	1319

U.S.A. RECORD HOLDERS

SINGLE OPERATOR

1.8	K1ZM('95)	327,712	308
3.5	WE3C('95)	1,519,300	475
7.0	KC7EM('95)	1,950,228	495
14	KC1XX('95)	4,787,328	832
21	WN4KKN/6('92)	4,538,050	814
28	WM5G('89)	4,213,127	799
AB	KM1H('92)	7,854,840	945
QRPp	KR2Q('92)	1,269,960	557

MULTI-OPERATOR SINGLE TRANSMITTER

WC4E('92)	11,611,929	1113

MULTI-OPERATOR MULTI-TRANSMITTER

WZ6Z('89)	18,737,170	1138

CLUB RECORD

Northern California Contest Club('92)	97,527,906

QRPp RECORD

HC8A('94)	7,520,562

WPX (Prefix) RECORD

HG73DX('91)	1,337

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	EA8AH('96)	7,101,380	715
14	EA8AH('97)	11,142,198	981
21	TR1G('90)	6,788,925	825
28	FR5DX('91)	7,543,818	831
AB	ZD8Z('94)	18,118,880	992

ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UA9CSS('94)	1,074,780	315
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	JH1AJT('89)	4,848,480	740
AB	C46A('98)	12,942,160	847

EUROPE

1.8	S52CD('95)	422,532	144
3.5	YT6A('96)	1,976,436	558
7.0	S50A('95)	4,536,756	714
14	IU9S('94)	5,677,177	869
21	CT2A('92)	6,029,559	919
28	9H1EL('89)	5,882,825	787
AB	GIØKOW('98)	10,563,579	1017

MULTI-OPERATOR SINGLE TRANSMITTER

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AS	TA5/NØFYR('91)	16,474,965	1005
EU	IJ4R('91)	16,027,956	1146
NA	VP2EC('92)	24,409,580	1115
OC	P2ØX('93)	13,440,570	858
SA	HC8A('93)	32,502,677	1107

NORTH AMERICA

1.8	VE3BMV/1('98)	464,166	241
3.5	TE1C('96)	2,161,568	496
7.0	TE1C('95)	7,281,630	745
14	KP2A('95)	7,088,976	912
21	WP3R('98)	10,167,632	986
28	J68AX('92)	4,709,985	651
AB	KP2A('93)	16,694,570	1006

OCEANIA

1.8	T32AF('83)	16,872	37
3.5	N6VI/KH6('94)	1,016,652	273
7.0	T32AF('93)	3,995,928	437
14	KG6DX('90)	4,558,527	733
21	AHØK('92)	7,206,850	698
28	P2ØA('92)	5,184,625	703
AB	WR6R/WH7('96)	11,258,410	815

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	P4ØA('96)	1,715,076	426
7.0	ZX9A('97)	10,787,128	814
14	PYØFM('95)	9,660,432	939
21	ZW5B('95)	14,095,142	1054
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060

MULTI-OPERATOR MULTI-TRANSMITTER

AF	ED8ACH('91)	47,278,236	1319
AS	P3A('98)	41,053,560	1255
EU	HG73DX('91)	30,664,095	1337
NA	VP2EC('94)	39,530,455	1285
OC	FKØAW('89)	26,538,972	1002
SA	ZZ5EG('87)	38,096,250	1250

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Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-15 Antenna Tuner

ATR-15, $399. Handles 1500 Watts RF output. Slightly less on 160 Meters. Bandswitched T-Network, peak reading SWR/ Wattmeter, covers 1.8-30 MHz, 6 pos. antenna switch, balun. 13½ W x5½x13¼ in. Perfect for AL-80B/AL572.

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AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube

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$2795

Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube

AL-1200

$2295

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Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

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1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

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with four Svetlana® 572B tubes

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CIRCLE 175 ON READER SERVICE CARD

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Keys and CW Going Strong!

Unbelievable but true! Amidst a time when Morse Code is being downplayed and occasionally depicted as outdated, keys and CW are hotter than ever ! Indeed, new varieties of hand keys, bugs, and paddles are hitting the market in record numbers, and they are being snapped up almost as fast as they are made. Some are readily available and commercially-made items, some are being produced in limited quantities by individuals, some are resurrected classics of yesteryear, and each brings newfound enjoyment to ham radio's most continuously popular mode of communications.

"Has Dave gone bonkers?" you ask. No, I just love keys and CW (doesn't everyone?). That's what drove me to write and self-publish my *KEYS II* book. It's loaded with views and information on over a quarter-million dollars worth of the world's most exotic keys, and it is available direct from me for $16.95 plus $2 regular or $3 priority mail. Check it out soon!

You may not be aware of all the neat keys available at the present time, because many are not widely advertised and rely on friends telling friends of them or acquiring exposure through small specialty stores. That's one of the reasons why we periodically feature keys in this "World of Ideas" column—to "bring together" new key producers/dealers and CW operators and to share views of special treats from eras past. Yes, and another blowout two-parter on keys is coming your way right now. It does not include all the new keys available today (that is an impossibility), but it is a reasonably accurate update on new items introduced since last spring's keys columns. Also, photos of all "new for '99" keys were not on hand as this column was being written, so yet another installment is planned for late summer or fall. We have some exciting ground to cover, so let's get started!

Photo 1– The Titanic *lives on! This recently introduced* Titanic *replica key is made by R. A. Kent engineers in England and available right now from Alpha Delta Communications of Kentucky. It is serial numbered, identical to the Marconi Wireless spark key used aboard the* Titanic, *and comes with a Certificate of Authenticity, plus a booklet detailing the* Titanic's *saga "log book style." The key is proving incredibly popular worldwide.*

New *Titanic* Replica Key

Titanic-related items and tales are presently making a big splash (no pun intended!), so let's begin this year's views with the recently announced *Titanic* replica key available from Alpha Delta Communications, Inc. and shown in photo 1.

This accurately detailed reproduction of the actual Marconi spark key used aboard the *Titanic* sports large high current contacts, a hefty yet well-balanced arm with sleeve-type bearings at the fulcrum, and a large top hat knob with skirt. The key has contacts and binding posts for both "make" and "break," plus the arm's tensioning spring pulls down from the far end traditional British style rather than pushing up from the knob end like most U.S. keys. The key's mechanism is untreated solid brass sitting on a rich mahogany-color wood base just like the original, and its melodious click-clunk sounds during use can be heard two or three rooms away (talk about reliving those classic days of old!). In talking with other CW enthusiasts, I learned many of them also have Alpha Delta *Titanic* replica keys, so this reproduction from yesteryear appears well on its way to becoming a highly prized and valued collectible.

Also supplied with the sequential serial-numbered key is a Certificate of Authenticity and a small booklet recapping events and communications associated with the *Titanic* on that fateful day of April 15, 1912. It is fascinating reading! The certificate has a sketch of the *Titanic* in top center, with portraits of its wireless operators, Jack Phillips and Harold Bride (very young men!), on each side. It is also serial numbered, printed on parchment, and suitable for framing. Even the shipping box gets in on this time-capsule creation: It is tan with a sepia sketch of the ship on the side, and it too is serial numbered.

Overall, it is quite an impressive package. Whether you collect keys or just use one to check your rig's SWR and power, Alpha Delta's *Titanic* replica key will add a special touch to your daily pursuits. *Titanic* keys are made by R. A. Kent Engineers in England (the *Titanic*'s homeland), and are available from Alpha Delta Communications, Inc., P.O. Box 620, Manchester, KY 40962. The toll-free telephone order number is 1-888-302-8777.

The *Titanic* and its replica key are surrounded by an endless number of true tales from telegraphic history that beg to be passed on from generation to generation. Some tales relate to the ship's 5 KW spark rig "reaching out" more than 1000 miles and some relate to the unfortunate event proving the merit of wireless communications. One ship *(The Californian)*, for example, was only 10 miles from the sinking *Titanic*, but their wireless was not on and they were unaware of the situation. Afterwards, new international regulations stipulated all ships in excess of 20,000 tons or carrying over 50 passengers carry a wireless set with a minimum range of 100 miles. Further, regulations specified the wireless set be manned 24 hours a day plus monitor the International Distress Frequency later established on 500 kHz. Radio officially "came of age"! This decree later included Coast Guard watches on 500 kHz and continued until approximately 1996, when they were discontinued—but overshadowed by the statement the Coast Guard would also discontinue using CW. Sort of reminds me of the *Titanic* replica

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Say You Saw It In CQ

key's small log booklet's last entry when the captain told Phillips and Bride "abandon your cabin. It's every man for himself."

Related Spark Era Keys

While on a historical roll, incidentally, another variation of Marconi spark key (and a genuine original) is shown in photo 2. This particular key is similar to the one used on the *Titanic*'s sister ship, the *Olympic.* The *Olympic* was on a return voyage from the U.S. to England at the time and copied the *Titanic*'s original "SOS at midnight." The ship "Carpathia" was much closer, however, so it served in rescue efforts while the *Olympic* continued on to England. Notice this key's base is comprised of four pieces (one atop the other, and two tongue/groove end pieces), plus it has the same adjustments, bearings, and rear tension spring. Our special thanks go to master key collector Gil Schlehman, K9WDY, for sharing views of this pride.

Two more versions or models of Marconi spark keys are shown in photos 3 and 4. (You didn't think the company produced only one model, did you? Heaven forbid, no. Marconi was one of the biggest names in spark keys!). The one in photo 3 has top-accessible travel and gap adjustments plus a brass nameplate inscribed "Marconi Wireless Telegraph Company of London." This key pivots from a rear-mounted strap, which seems to reflect

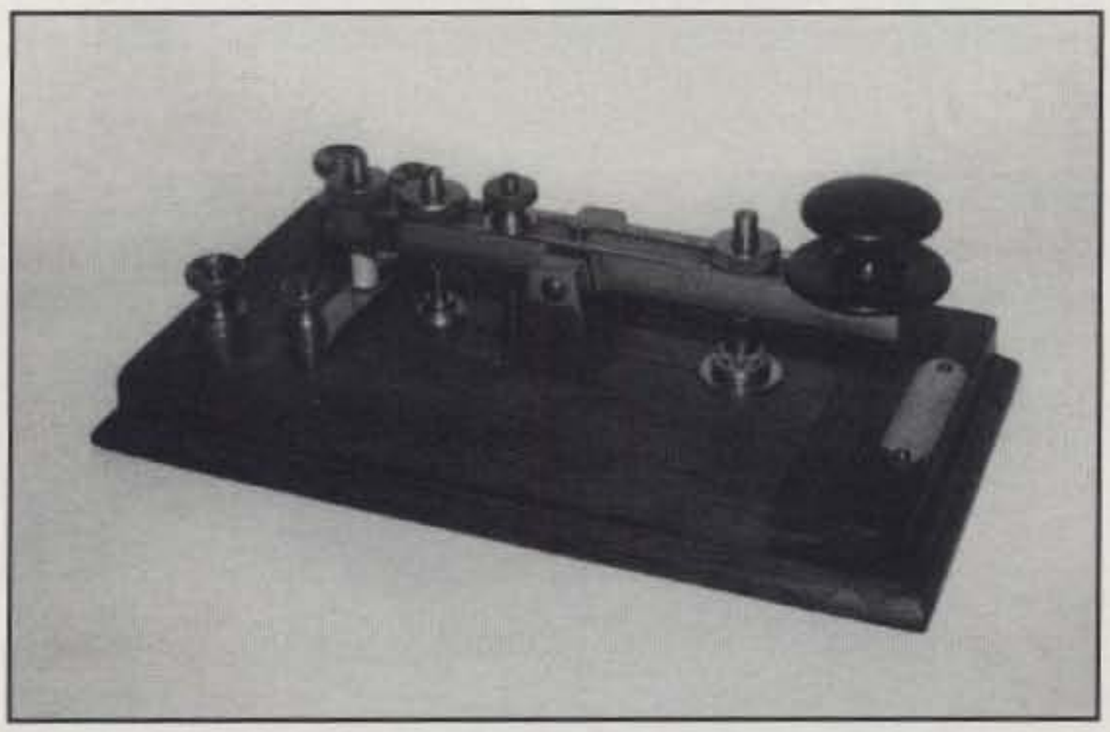


Photo 2– This original and authentic Marconi Wireless spark key is similar to the one used on the Titanic's *sister ship, the* Olympic. *Today it proudly resides in the world-class key collection of Gil Schlehman, K9WDY.*

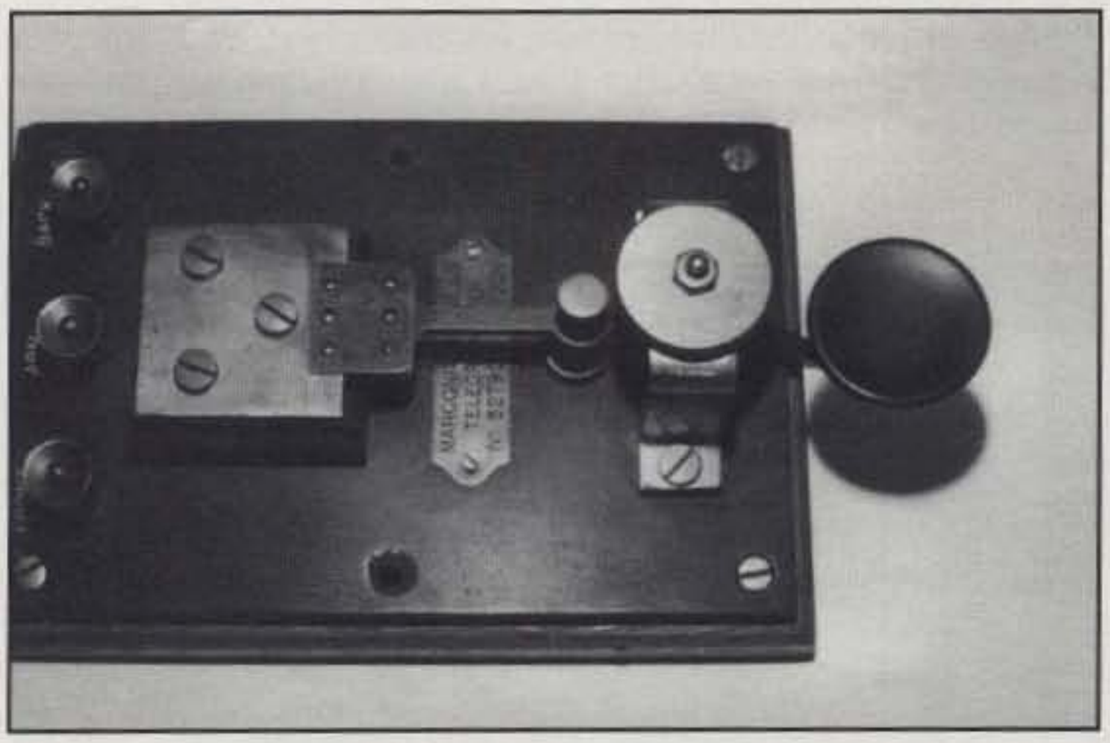


Photo 3— Another Marconi Wireless spark key in the K9WDY collection. This one is based on the Steiner key design and uses a flexible metal strap to support its arm. Top adjustment closest to knob sets arm tension. Fingerscrew adjustment between it and flexible metal strap sets gap. (Photo courtesy K9WDY.)

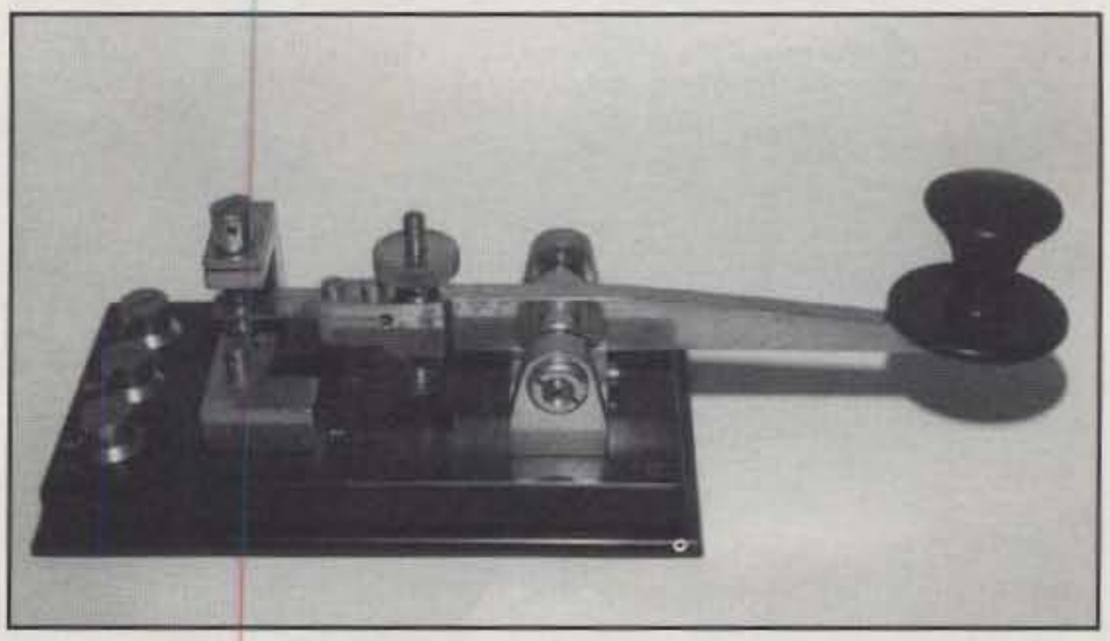


Photo 4– This Swedish key "look alike" from Marconi Wireless sports an elaborate bearing assembly at the fulcrum, contacts on a leaf spring strap, and an extra-long arm for an elegant feel. This smooth-handling gem may have challenged a legendary Swedish key for top honors in hand key heaven. (Photo courtesy Gil, K9WDY.)

German influence. The other Marconi key (photo 4) looks like a forerunner of the legendary Swedish key known worldwide for its marvelous feel. I base that statement/observation on the key's rear spring metal contact, unusual tension adjustment thumbnut, and its extra long arm which extends well beyond the key's base for ultra-smooth handling. These two keys are also K9WDY collection prides.

Super Spark Key

Next is the fascinating and totally awesome Lowenstein "type A" spark-era key shown in photo 5. Notice the hefty rear connection terminals plus massive contacts for use with large high-power (flame throwing!) rigs, and the rear pivoting arm which is indicative of traditional German design. The key's gap is adjustable by the top-mounted thumbscrew, and the coil-type tension spring is adjustable from the bottom. Just studying this classic of yesteryear regenerates one's appreciation for telegraphy. This rare key is also part of the K9WDY world-class collection.

Mystery Spark Key

Spark-era keys just naturally inspire curious thoughts and study, and the Siemen Brothers item shown in photo 6 is a good example of that fact. It is quite old and a mite crude, but it has elaborate-for-the-time sleeve bearings with a center set screw on the pivot pin plus large contacts for both "make" and "break." Look

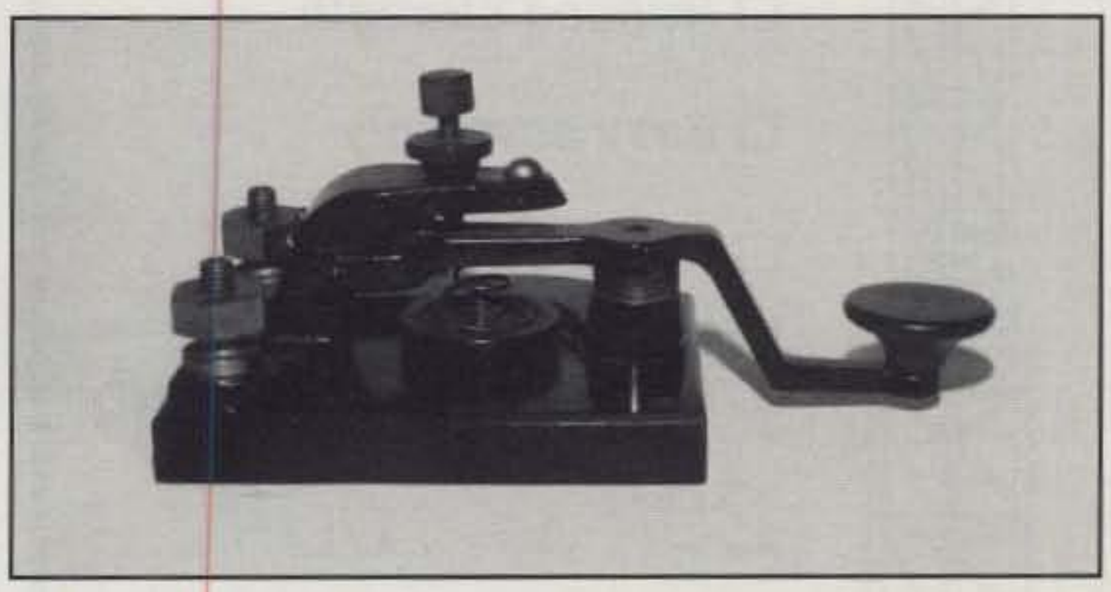


Photo 5– Check out this rare and unusual Lowenstein "type A" spark key, gang. It sports a rear pivoting arm of traditional German design and very large contacts for primary line-keying large fire-breathing spark rigs of yesteryear. Stand back! (Photo courtesy Gil Schlehman, K9WDY.)

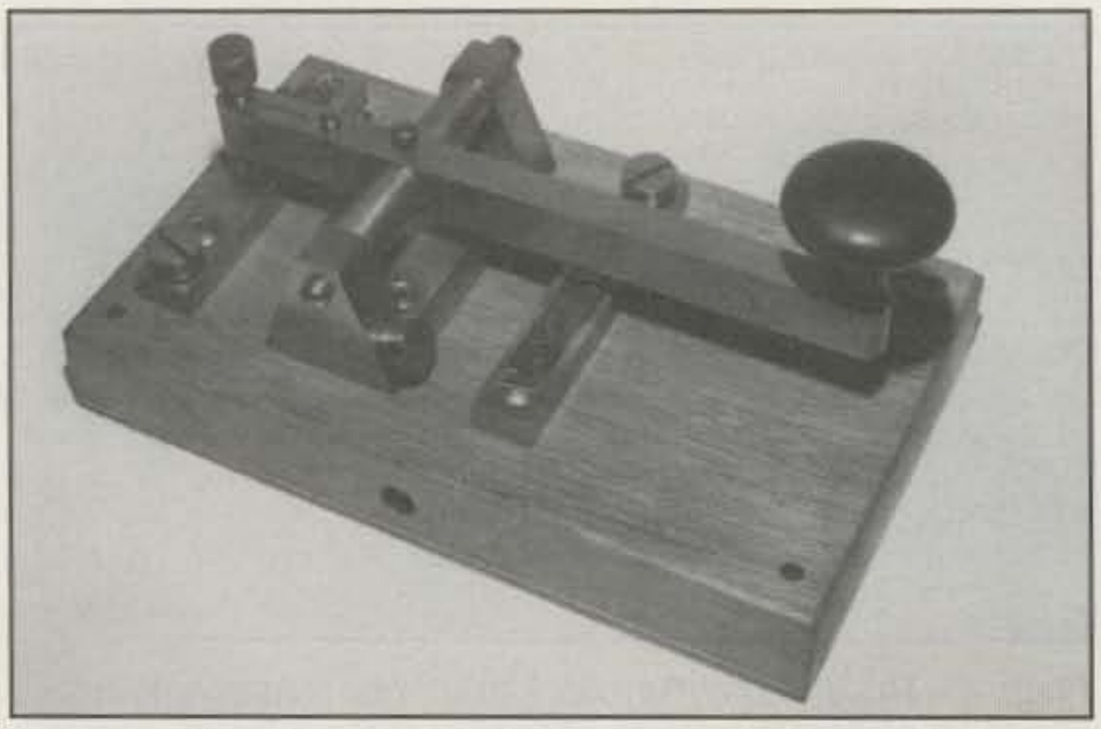


Photo 6– Rare Siemens Brothers spark era key has some interesting points of study for its time. Item was probably used in landline rather than maritime service. (Photo via K9WDY.)

close and you will see screws for connecting wires on the front and rear straps plus the fulcrum's left side. Even closer study with a magnifier will reveal the manufacturer's name inscribed on the front edge of the fulcrum. Might this key be an early item from today's multi-corporation giant? Thanks again to Gil Schlehman, K9WDY, for sharing this view.

New Keys for CW Devotees

Now returning to the new key category, we continue with a real glitz and glamour item: the recently announced "super paddle" made by Donald Hensley, AC4HB (photo 7). This dream key is similar in design to the famous "Mercury" paddle that was made by the late Steve Nurkiewicz, N2DAN/SK, and is now in limited production by Bencher Company. It's built like a battleship, handles like a sports car, and looks like a million dollars.

Looking at the Hensley paddle's mechanism, each "L" shaped arm has a fingerpiece on one end, a gold-surfaced contact on the other end, and pivots on roller bearings under the center hex-shaped support. Tension is varied by a magnet behind each arm. When a fingerpiece is moved, starting inertia to overcome magnetic pull or tension produces a sort of snap action with resultant movement causing arm and post contacts to mate in an error-free manner. The overall feel is in a class of its own. Very nice! The Hensley paddle is exquisitely chrome-plated and fine-detailed with white teflon washers, red fingerpieces, and red-colored magnets. It is available in a square or round based version and in limited quantity (each one is hand made over many hours) from Donald Hensley, AC4HB, P.O. Box 338, Ark, VA 23003 (804-693-9250).

While spotlighting distinctive, world-class keys, we must bring in the unique and unrivaled Eureka hand key made by Ken Hirschberg, K6HPX, of Cal-Av Labs and shown in photo 8. Like the Mercury, Hensley, and Cal-Av's previously-featured "Spirit" touch paddle, the Eureka key is another "high end" item in the $500 category. Inside its 4-inch diameter enclosure (which is available in polished brass, chrome, or gold plating) is an invert-

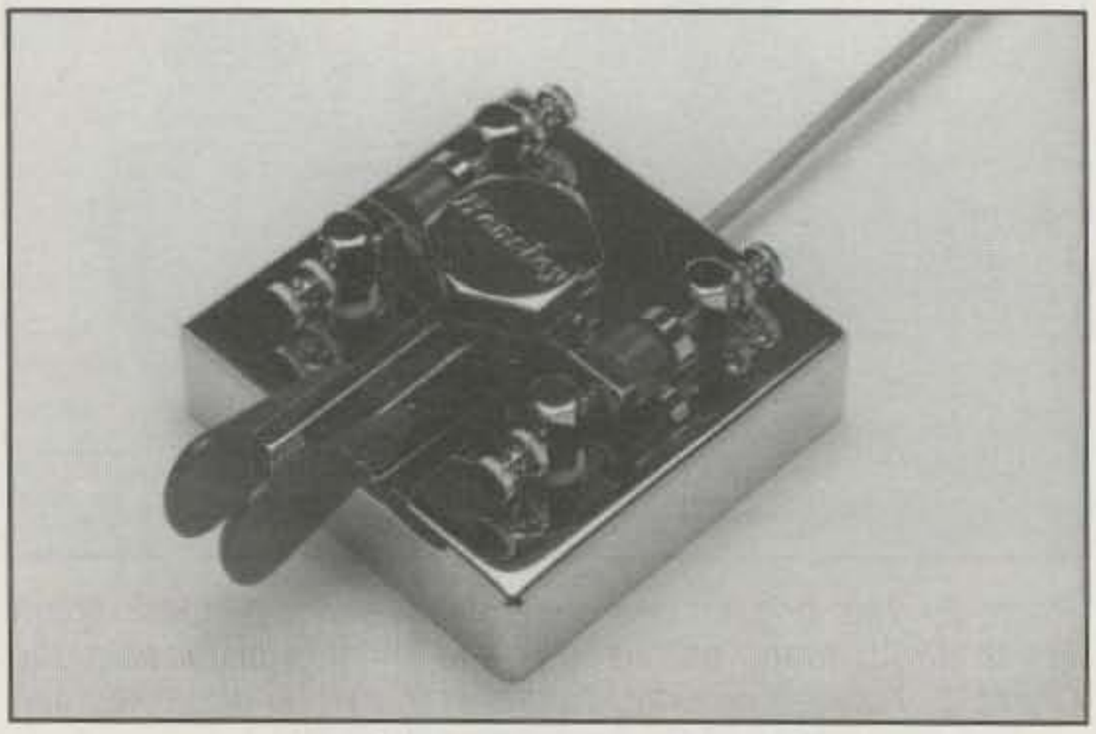
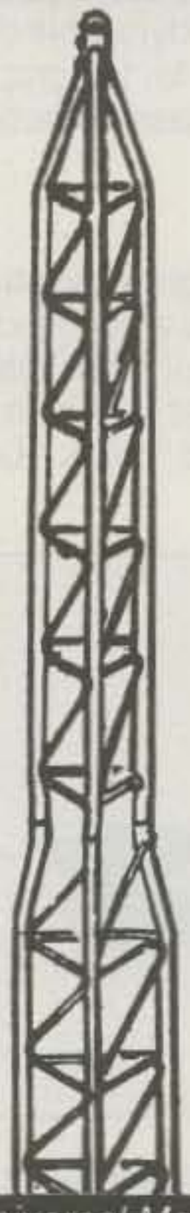


Photo 7– Total class, flash, and glamour galore best describe this new magnetically tensioned dual-lever Hensley paddle. Item is exceptionally well-made, handles great, and captures attention from across a room. It is available in both square- and round-base versions from Donald Hensley, AC4HB, of P.O. Box 338, Ark, VA 23003.

Photo 8– This is the incredible and yes, a bit extravagant Eureka pump key made by Ken Hirschberg, K6HPX, of Cal-Av Labs. Key has a magnetically tensioned mechanism with gap and tension adjustable from the top, and boasts very smooth operation.

ATTENTION !!!



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ed, magnetically tensioned and ultra smooth-handling mechanism. The arm moves on a pair of stainless-steel ball bearings that work to aid magnetic tensioning and produce positive keying. In other words, it is difficult to make half characters due to depressing this key's knob only part way. It almost "drives itself." This hallmark key is available from Cal-Av Labs, 1802 W. Grant Rd., Suite 116, Tucson, AZ 85745 (520-624-1300).

Affordable Glamour

Another (smaller and less expensive) round-based beauty is the irresistible little Hi-Mound MK-8 dual-lever paddle shown in photo 9. You really should hold this doll in your hand to fully appreciate its charm. It has a brilliant chrome finish, clear plastic top cover with nameplate, and gold-plated contacts. The fingerpieces are close-spaced so it can be used like a single-lever or dual-lever paddle according to your mental image of it. A thumbscrew on the left side sets tension, and set screws on each side set gaps. If you are looking for an affordable round-based paddle maybe to fit in the cup holder of your car's console for CW mobiling, this one is a winner! It, plus our next two bugs, is available from Marshall Emm, N1FN, of the Morse Express in Aurora, Colorado.

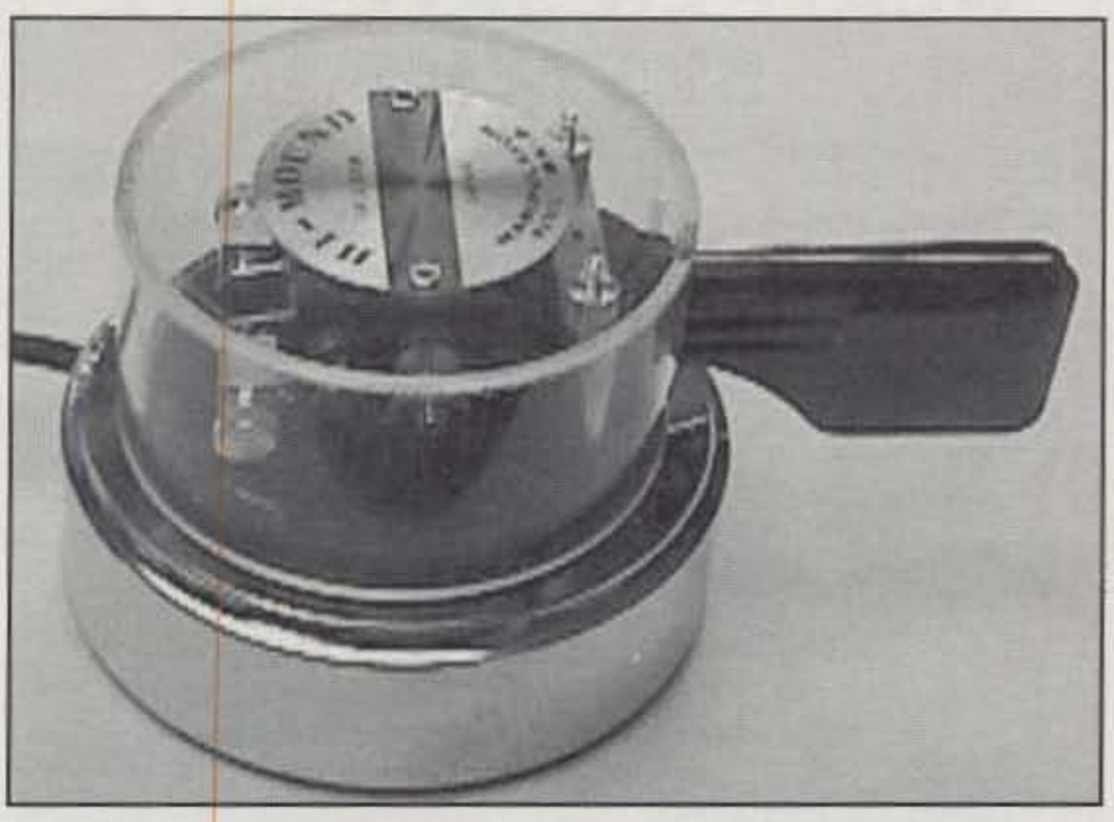

Photo 9– Want a fancy little round paddle at economical cost? The Hi-Mound's MK-8 looks terrific, handles beautifully, and even fits in the cup holder of many car's consoles. (Photo courtesy Marshall Em, N1FN, of Morse Express.)

Next Generation Bugs

Next up are two new and exciting bugs: the magnetically-linked Hi-Mound BK-200 shown in photo 10 and the optically-coupled GHD/Toshihiko Ujiie bug shown in photo 11. The BK-200 utilizes a high-speed magnetic switch mounted at its "far end" (directly past the pendulum) to make dots. It is activated by a small magnet mounted on the pendulum's tip end (1/16 inch from the magnetic switch assembly) to make dots. As a result, dot contacts never require cleaning or adjustment. The bug's pendulum is longer and smoother handling than usual, and speed range is extra-wide—typically 12 to over 30 wpm. Looking more closely at the BK-200, there is a regular dash contact, tension adjustment, and binding posts on the key's right side and a pendulum travel limiting screw plus extra weight for slow speed use on the bug's left side. The BK-200 weighs 5.5 pounds for "stay put" operation, and its overall black-and-chrome motif is striking in appearance.

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	100FT/UP	500FT	1000FT
"FLEXIBLE" 9913 STRD BC CNTR FOIL + 95% BRAID 2.7dB@ 400MHz NC/DB/UV JKT	.58/FT	.56/FT	.54/FT
LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.59/FT	.57/FT	.55/FT
LMR 400 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	.79/FT	.78/FT	.77/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JKT	1.25/FT	1.22/FT	1.20/FT
LDF4-50A 1/2" "ANDREW® HELIAX®" 1.51dB @ 450MHz	25FT/UP 2.10/FT		

COAX (50 OHM "HF" GROUP)

	100FT/UP	500FT	1000FT
RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.36/FT	.34/FT	.32/FT
RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz		25FT/UP	1.75/FT

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RG142/U SOLID SCCS 2-95% SILVER BRAIDS *Teflon*® JKT 8.2dB/1100WATTS @ 400MHz.....25FT/UP 1.25/FT
RG303/U SOLID SCCS 1-95% SILVER BRAID *Teflon*® JKT 8.6dB/1100WATTS @ 400MHz.....25FT/UP 1.00/FT

COAX (75 OHM GROUP)

RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS....44/**100FT/UP**.....42/**500FT**.....40/**1000FT**
RG6/U CATV FOAM 18GA CC8 FOIL + 60% ALUM BRAID .....20/**100FT/UP**.....13/**500FT**.....12/**1000FT**
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	100FT/UP	500FT	1000FT
"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.20/FT	.18/FT	.16/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.25/FT	.24/FT	.23/FT
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5971CPS125. 125ft (cable same as above) w/Jones plug to socket assembly	$39.95/ea		
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

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14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.14/FT	.12/FT	.10/FT
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14GA SOLID *"COPPERWELD" (for long spans etc.)*	.10/FT	.08/FT	.06/FT
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	.10/FT	.08/FT	.06/FT
ROPE: 3/16" DOUBLE BRAID *"DACRON"* 770# TEST WEATHERPROOF	.12/FT	.09/FT	.08/FT

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150FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400MHz	99.95/EA
100FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400MHz	69.95/EA
75FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400MHz	54.95/EA
50FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400MHz	39.95/EA
25FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400MHz	24.95/EA
6FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400 MHz	12.95/EA
3FT *"FLEXIBLE"* 9913 FOIL +95% BRAID 2.7dB @ 400 MHz	11.95/EA
100FT RG213/U MIL-SPEC BURIAL JKT 1.5dB @ 50MHz	49.95/EA
75FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5dB @ 50MHz	39.95/EA
50FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	29.95/EA
25FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	19.95/EA
6FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	11.95/EA
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100FT RG8MINI(X) 95% BRD UV RES JKT 2.5dB @ 50MHz	24.95/EA
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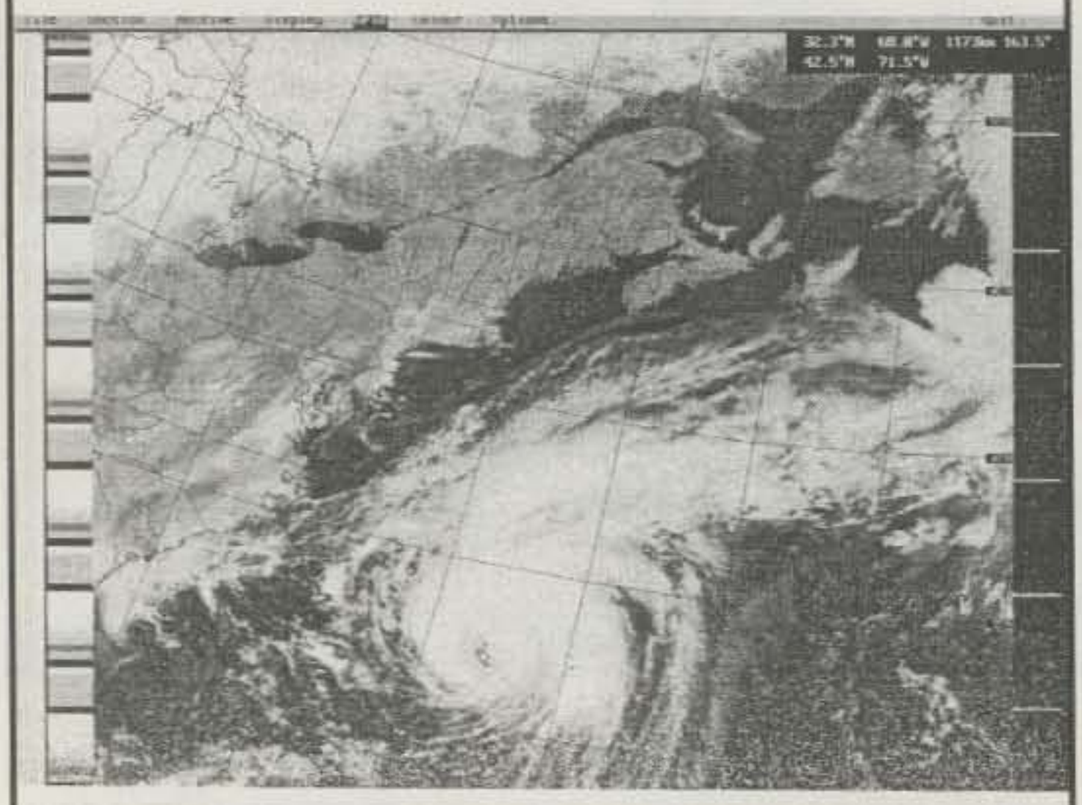

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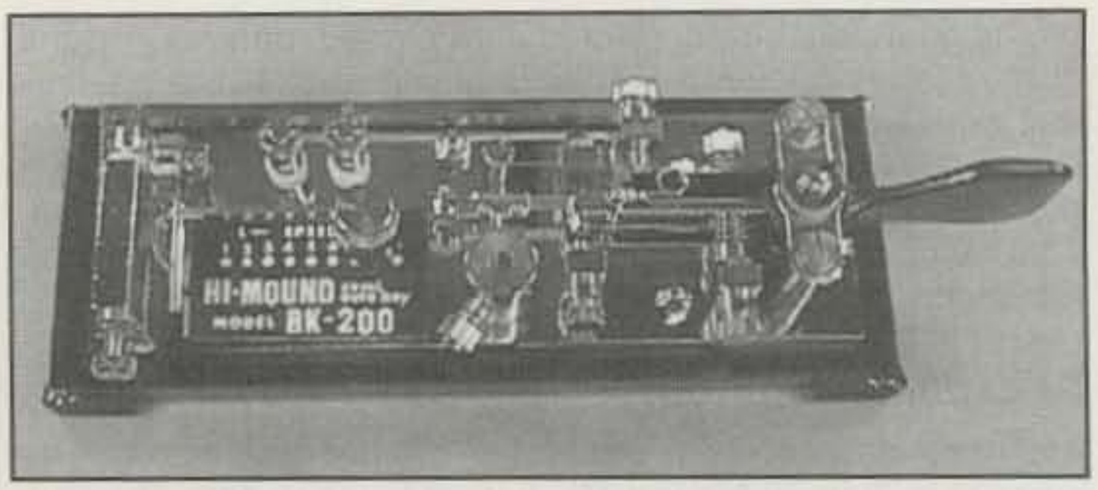


Photo 10– What's new in bugs for 1999? Hi-Mound gives us a peek preview with their new BK-200. Item utilizes a magnetic switch to make dots and has an exceptionally wide speed range. (Photo courtesy Marshall Emm, N1FN, of Morse Express.)

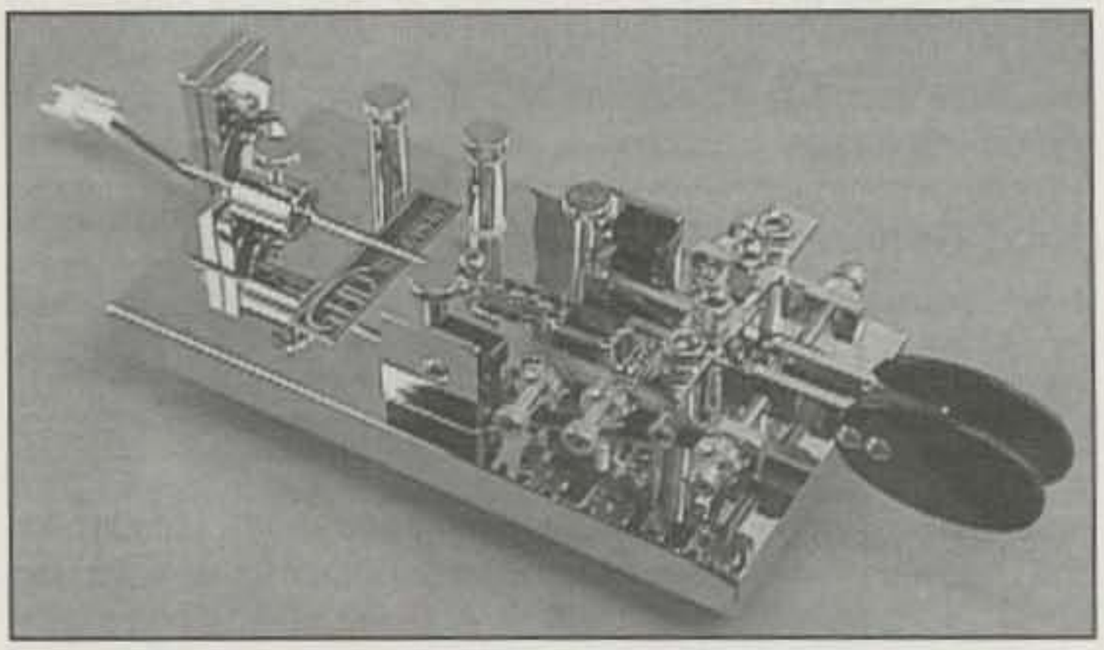


Photo 11– Another "new for 1999" bug is this flashy GHD item. It employs optical coupling in lieu of mechanical contacts to make both dots and dashes. This is the way to expand the enjoyment of your CW activities! (Photo courtesy N1FN, Morse Express.)

The GHD bug utilizes a light beam (actually the breaking of a coherent/LED beam) to make both dots and dashes. Notice the small chrome box on the left side where dot contacts are usually located on a regular bug. A light beam emitted from the box bounces off a reflective tag on the pendulum and is sensed by a photocell in the box. A similar box, light beam, reflective tag, and photocell are used on the bug's right side and right arm to make dashes. A circuit board with surface-mount components under the bug handles electronic sensing and output keying. It is powered from an external 10 to 15 volt source. Other noteworthy features include an elaborate yoke assembly and fancy rear damper. GHD also makes (and Morse Express also carries) mechanical version bugs plus an optically linked paddle. These items (and more goodies!) are available from Morse Express, 2460 S. Moline Way, Aurora, CO 80014 (order line 1-800-238-8205).

Whoa, Nellie! We've keyed all the way to the closing wire and still have more tales and views to go—of new Vibroplex goodies, a new Chubbock replica key, funky bellboy, farmboy, Flintstone keys, and more. I'm sure you will also like the new Captain Marvel Ring Key from KK5PY. Stay tuned. 1999 is a hot year for keys! Meanwhile, let's QSO one night soon on 30 CW. May the force of good signals be with you!

73, Dave, K4TWJ

"During my 50 years in Amateur Radio, almost everything has changed—technology, world affairs, people, business and more.

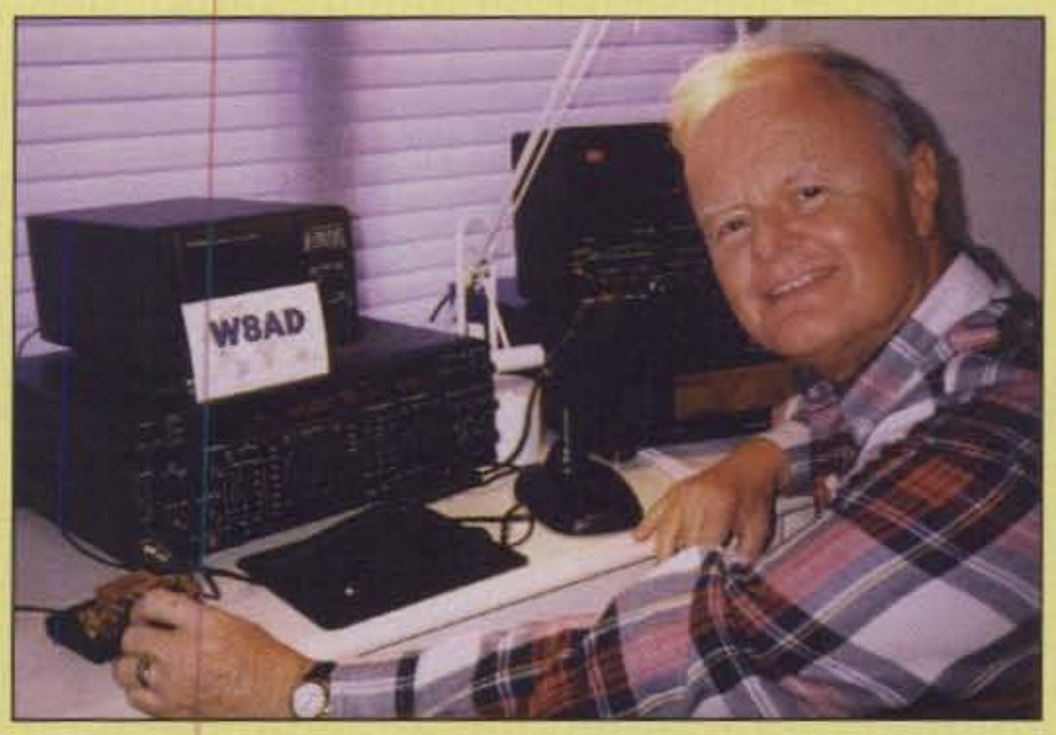
One of the most important things I've learned about business over all those years, both as a customer and a designer/manufacturer, is this: If you produce the best products you can, with the highest quality, fair pricing and excellent customer service, everything else will take care of itself. That's one philosophy that doesn't change at Alpha Delta!"

—Don, W8AD, ex-W9JTN

W9JTN's first SWL set-up in 1948
NC-33, RME preselector, long wire

Don, W9JTN, in 1951, with HQ129X,
HT-18 at 10 watts and 10 mtr dipole

W9JTN, 1952, with SX-71, HT-18,
Pair of 814s— about the same
Power as a modern transceiver.
40 meter dipole



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THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

From The Notebook—Part II

This month we'll again open the "Digital Dipole" notebook for a potpourri of antenna and book topics, as well as an interesting "short burst." We'll kick things off this time around by first opening the notebook to antennas.

From the core of The Big Apple, Joe Fairclough oversees The Radio Club of Junior High School 22, NYC, Inc. Its focus is the hobby as an alternative to the hard realities of inner city life. From just 30 students in 1980, over 400 students are enrolled in the EDUCOM program today, and the club is The Big Apple's largest amateur radio club. (QSL card courtesy Joe Fairclough, WB2JKJ)

Antenna Notes

Goodies and Catalog from Antennas & More. Several times over the past few years we have featured some of the many innovative antennas and antenna accessories from AntennasWest of Provo, Utah. We were quite surprised to find that the firm closed its doors in February 1998.

We found, however, that the spirit of AntennasWest lives on, with three individuals who had worked for the company (Randy Spencer, KC7GGN; Wayne Smith, KC7NMZ; and Chuck Fryar, KA7SQN) forming a new company, Antennas & More. Their motto, appropriately, is "still the same products, and excellent quality." As a result, they're now the source for all of the former AntennasWest products and services. Owners of AntennasWest products should be glad to hear that they can handle technical support and warranty services for the old lines.

Antennas & More has issued a 19-page catalog that details the new firm's current offerings. These are quite numerous, and include a G5RV dipole, Half Square wire beam, Maxi-J end-fed roll-up vertical, multiband Omni-Loop, Slinky dipole, VHF/UHF Corner Beam, Fox Loop and Walking Stick, Roof-Topper base station, Pocket-J dual band, compact Windom, HT replacement, high-gain Satellite Tracker, and various other HF, VHF, and UHF fixed station and mobile antennas. Also offered is a variety of antenna parts, coax, baluns, nylon support line, antenna launch systems, attenuators, duplexers, coax switches, and other accessories.

One interesting new product offered by Antennas & More is an $11 Marconi Adapter. This is a device for a regular-size G5RV dipole that effectively converts the antenna into a Marconi by tying both sides of the feedstub together and feeding them against a counterpoise. This little trick can let you work 160 meters with an otherwise small dipole, although you'll have to experiment with the size and type of counterpoise for best results on the "top band."

289 Poplar Drive, Millbrook, AL 36054-1674

For more info and a free catalog, contact Antennas & More, P.O. Box 51591, Provo, UT 84605 (1-888-277-5718; e-mail: <wayne@antennasmore.com>; web: <http://www.antennasmore.com>).

Heavy Duty Tower Jack and Other Tower Goodies. As we noted in the August 1995 column, we amateurs have used everything from scissor jacks to 2×4s to disassemble our tower sections, with varying degrees of ease, success, and above all, safety. In that column, we noted a useful new product, Tower Jack, to help you disassemble your tower.

Billed as "the greatest friend you'll ever need with you on a tower," it is designed especially to dismantle Rohn Models 20, 25, 45, and 55 tower sections. Its goal is to ease the often back-breaking work involved in uncoupling tower sections that have stood exposed to the weather for several years. The $44.50 unit is a sort of lever that gives you a "mechanical advantage" in uncoupling the sections.

Now a new, Heavy Duty Tower Jack is available at $59.50, and it boasts increased leverage. Both Tower Jacks carry a lifetime guarantee, and the regular-duty unit still is available.

Newly offered are a number of related products to help you in working with your tower. These include Leg*Aliner ($33.95), an aid in aligning tower legs that don't quite line up properly during tower erection; Tower*Block ($56.50), to be used in conjunction with a ginpole to allow the ground crew to stand away from the danger of falling objects and allow a horizontal pull on the ginpole rope; Safety*Strap ($11.95), which clips to your climbing belt to make tower climbing safer and easier; and T.J. Hard Hat ($16.75), to provide a high degree of comfort, safety, and shock absorption.

Also offered is Tower*Guard ($114.50), a 150+ electrode static discharger to help eliminate tower and antenna strikes; Tower*Lube ($6.25), a long-lasting lubrication to be applied to hard-to-assemble tower sections; and a Utility Capstan Electric Winch-Hoist that provides 800 lb. single-line or 1600 lb. double-line lift.

A flyer with more information is available from Tower Jack, P.O. Box 1191, Mt. Juliet, TN 37122 (1-800-242-0130).

Postscript: We should caution you that both the installation and dismantling of towers are inherently dangerous opera-

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tions. Many serious, even fatal accidents have occurred because people assumed that situations were safe when they were not safe at all. In fact, tower dismantling can be *more* dangerous than installation, since the condition of the tower, guys, anchors, or roof may be unknown.

In working with towers, you should follow three tower safety watch words. First, don't take unnecessary chances when climbing a tower; second, quit climbing the tower if things aren't going well; and third, read and follow all safety precautions when working with a tower. You should always exercise caution when working on your tower and wear a safety belt when climbing it.

Also, keep in mind that antenna, tower, and tower accessory manufacturers can't be held responsible for accidents or other incidents involved in the improper use of their products. All they can do, really, is to give you the proper tools to do the job right, and hope that you take care to observe all the right safety precautions.

Antenna Supermarket SWL Antenna Update. It's been nearly five years, in the July 1994 column to be exact, since we last profiled the excellent shortwave listener (SWL) antenna products offered by Antenna Supermarket. Their product line features three HF receiving antennas, several gas tube lightning arrestors, and SWL accessories. An important point to note is that all of the antennas offered now are sold complete with the appropriate receive-only electronic gas tube lightning arrestor, either the coax or the twinlead-fed and longwire arrestor version.

The antennas offered include two "Eavesdropper" 8-trap, 42 ft. long dipoles that cover all of the major international shortwave broadcast bands from 11 to 75 meters with one feedline; twinlead and coax feedline versions are offered. A third antenna is a 67 foot, coax end-fed, coil-loaded sloper covering the AM broadcast band and 120 through 13 meters. Each antenna is $79.95 plus s/h, and each comes with the appropriate lightning arrestor. The arrestors also are available separately for receiving and transmitting for parallel-conductor or coax feedlines.

A nice feature of the Antenna Supermarket product information sheet is a short but useful beginner's tutorial on receiving antenna selection, installation, lightning protection, and weather protection, all aimed at the SWL. Special stress is placed on the need to protect the sensitive front ends of solid-state receivers from voltage build-ups and static discharges on long antennas and feedlines.

For a flyer, contact Antenna Supermarket, P.O. Box 563, Palatine, IL 60078 (847-359-7092). Their products also are available at selected dealers.

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Official Mobile QSL of the "22 Crew" from "the Core of the Big Apple"

Here's the "Official Mobile QSL" that's used to confirm contact with the "22 Crew" from New York's JHS 22. The mobile vehicle, which is pictured here from the rear, is a Corvette- powered, 1994 Chevy Impala. The Crew's mobile unit can operate from 80 meters through 440 MHz. (QSL card courtesy Joe Fairclough, WB2JKJ)

over the years, we've mentioned the extensive product line of inexpensive, high-quality, and good-performing fixed station and mobile antennas and accessories made by the Lakeview Company of Anderson, South Carolina. We began covering Lakeview products in the early 1980s after interesting discussions with founder George Shira, WD4BUM, at several southeastern hamfests.

As we have noted, George founded the company in 1982. His thinking was that the cost of a simple antenna was too high, and he could build antennas himself that would outperform others. This approach resulted in the first Hamstick® mobile HF antenna. George retired in 1991, turning the reins over to son Butch, WA4XXX, who has made available many new and upgraded products from what he calls "the Hamstick people."

Perusing the company's latest flyer shows a couple of new and improved products of interest to antenna buffs. These include an enhanced, compact Discone scanner antenna ($36.95) that now covers 800–900 MHz with enhanced performance and also allows transmit operation on the 146, 220, and 440 MHz bands. Another new product is an innovative license plate antenna mount ($44.95) that mounts behind your license plate and even includes a ground strap. The mount is made of stainless steel and accommodates antennas with standard 3/8" × 24 threads.

The Lakeview Company product line now is offered by several dealers, but they still sell direct to amateurs. An eight-page flyer covers their entire product line, including the ever-popular, single-band Hamstick® and multiband Carolina Bug Katcher mobile antennas.

Contact Lakeview Co., Inc., 3620-9 Whitehall Rd., Anderson, SC 29626 (864-226-6990; e-mail: <hamstick@hamstick.com>; web: <http://www.hamstick.com>). (See fig. 1.)

From the Bookshelf

Radio Aerial Concepts. J. L. Richardson, KB5NJW, offers an interesting new book, *Radio Aerial Concepts*. The book is a sort of eclectic antenna scrapbook that covers a very wide variety of antennas, both old and new, and the intriguing concepts behind them as interpreted critically by the author.

Covered in the new 142-page book are diverse, unusual, and sometimes little-known antenna types for HF, VHF, and UHF such as the F-Beam Folded Feed System, Half-Folded Ground Plane, Loop Yagi Boomerang Beam, Normal Mode Helical, Stacked Half-Folded Dipole, and various short loaded antennas. The book also includes a number of VLF (very low frequency) antennas and not too difficult construction projects.

The *Radio Aerial Concepts* book is available directly from the author for $24.95 postpaid. Contact Radio Aerial Concepts, P.O. Box 37, Clarksville, AR 72830 (501-754-2076).

Information Management for the Intelligent Organization. Recently, we noted Paula Berinstein's authoritative book *Finding Statistics Online*, published by Information Today, Inc. As we noted, the book addresses the often difficult problem of finding stats on the Internet.

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SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
SS-25M*	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30M*	25	30	3 3/4 x 7 x 9 5/8	5

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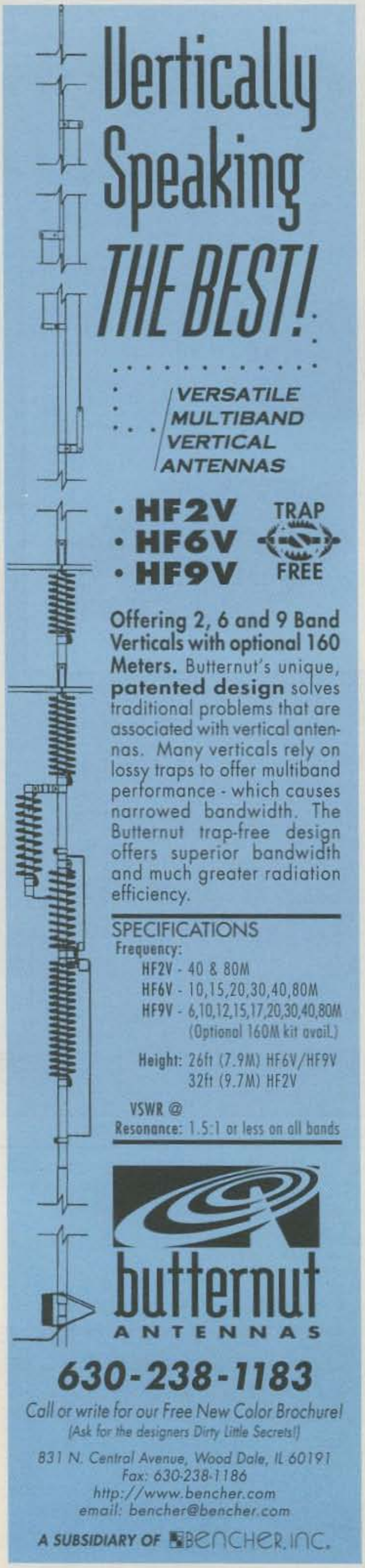

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Fig. 1– The Lakeview Company operates this attractive and easy-to-use website which depicts the company's line of made-in-the-U.S.A. antenna and antenna accessory products. You'll find the site at <http://www.hamstick.com>.

Recently we became aware of another helpful book from the same publisher, *Information Management for the Intelligent Organization*, Second Edition, by Chun Wei Choo. The book stresses the critical importance of processing information correctly into knowledge to guide your action. Its objective is to help the reader understand how to manage information processes more effectively to achieve personal and business goals.

For a copy of the book, contact your local bookstore or Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750 (1-800-300-9868; e-mail: <custserv@infotoday.com>; web: <http://www.infotoday.com>). The book is $39.50 plus s/h.

Crestone Technical Books Catalog. Last March we briefly mentioned Crestone Engineering in the column. They're now known as Crestone Technical Books, but they still have a goal of providing RF and microwave engineering books in the areas of circuit design, communication system design, electromagnetic compatibility, and related technologies. (The name Crestone, incidentally, was inspired by Crestone Peak at 14,294 ft. and Crestone Needle at 14,197 ft., located near the Great Sand Dunes in Colorado, two of the most rugged mountain peaks in the U.S.).

The new Crestone catalog includes about 270 different books, video courses, and software products. These include several in topical areas of interest to radio amateurs, such as frequency synthesizers, transmission lines, antennas and propagation, and digital signal processing. Importantly, new book additions also include many that are very basic in technical content. These books are intended for both nonengineering professionals and engineers who need information outside their specialization.

For a free catalog, contact Crestone Technical Books, 4772 Stone Drive, Tucker, GA 30084 (telephone 770-908-2320; e-mail: <crestone@noblepub.com>; web: <http://www.noblepub.com>).

Two from Macmillan Publishing USA. As we mentioned previously, one good thing about being a magazine columnist is that your mailbox often fills up with new and interesting books. Recently, Macmillan Publishing USA sent me two new Windows 98 computer books, one carrying the Sams imprint and the other carrying the Que® imprint. And, I might say, the timing was very good, as the books arrived at about the same time I was about to purchase a new PC and upgrade to Windows® 98!

A very basic and helpful Sams book is *How to Use Windows® 98,* by Douglas Hergert. The 280-page book, which bills itself as "the complete step-by-step solution," is presented visually in full color and sports straightforward, easy-to-follow directions using visual icons. Very clear pictures lead you easily through each task, such as showing how to manage files and folders, navigate using Active Desktop, browse the Web with Internet Explorer 4, access e-mail and news with Outlook™ Express, use Windows 98's built-in accessories, and employ the several new Windows system tools. The book is $24.99.

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A second book of considerable interest to new Windows 98 users is *Using Microsoft® Home Essentials 98*, by Faithe Wempen. The 589-page, $29.99 Que® book is especially helpful if you purchase a new Windows 98-equipped PC with Microsoft® Home Essentials bundled with it—and many PC makers, such as Dell, Gateway, and others, include Home Essentials with some of their PCs. Home Essentials includes a variety of useful software packages such as Microsoft Works, Word, Money, Internet Explorer, Greetings Basics, Encarta (an encyclopedia), and the Puzzle Collection (a games and entertainment package).

The documentation provided for these program bundles by Microsoft and the PC vendor is limited, so the Que book offers a nice, all-in-one-place source of basic, what-you-need-to-know information to productively use the software bundle. Included with the book is a quick reference page to summarize and simplify common Home Essentials tasks. It is $29.99.

Check out these two books in your local bookstore, or contact Macmillan Publishing USA, 201 West 103rd St., Indianapolis, IN 46290 (1-800-858-7674) for a free computer books catalog (e-mail: <info@mcp.com>). Or go online to check out the excellent Macmillan Computer Publishing website; you'll find it at <http://www.mcp.com>.

Short Bursts

Donate Your Radio to the Crew at 22! Way back in the April 1988 column—nearly ten years ago—we first took note of the successful amateur radio education project of Joe Fairclough, WB2JKJ. As we pointed out at the time, Joe found that using the conventional methods of teaching English at New York City's Junior High School 22 just didn't work well with the students with which he was working. Thinking that there must be a better way to handle the task, Joe decided to combine the school's English curriculum with amateur radio.

In 1979 Joe wrote up his proposal for the New York City Board of Education. The Board approved his proposal to begin the course, which then was called "English Through Ham Radio" and now is called "Education Through Communication," or EDUCOM, the motto of which is "education through communication—everything else is just regular radio." Students not only use amateur radio as a learning tool, but they also work and plan lunchtime and after-school projects involving the hobby as an alternative to drugs, gangs, vandalism, and other hard realities of inner city life.

From just 30 students enrolled in the pioneering 1980 program, over 400 students are enrolled in EDUCOM today. Even more impressive, the club, the Radio Club of JHS 22, NYC, Inc., nicknamed the "22 Crew," reportedly is "The Big Apple's" largest amateur radio club.

As you might expect which such a program, there have been ups and downs over the years, including budget cuts which threatened its existence, as well as the theft of radio equipment from the classroom. But the program has survived all these years and has been the subject of some high-level support, including that of former President Reagan, the late Senator Barry Goldwater, K7UGA, and New York City's former Mayor Ed Koch.

The program receives no funds from any government agency or from the school system; all of the equipment was purchased through the fundraising efforts of Joe and his students. The project has been incorporated in New York as a non-profit corporation, and has been granted IRS 501(c)(3) status as a publicly supported charitable organization. Thus, your contributions of cash or used gear qualify as tax-deductible.

Joe indicates that the project can only survive through property donations; if you're interested in disposing of amateur gear or other property the organization might make good use of, contact him at The Radio Club of Junior High School 22, NYC, Inc., P.O. Box 1052, New York, NY 10002 (telephone 516-674-4072; e-mail: <crew@wb2jkj.org>; on the web: <http://www.wb2jkj.org>).

Hopefully, we have aroused your interest in this worthy project. What has succeeded in New York City has potential for similar programs succeeding elsewhere; the only way to find out is to try it. I might add that some of the practical lessons learned by the 22 Crew and which might be very helpful in establishing your own amateur radio educational program are covered in Joe's article "Get Kids Involved—and Keep 'Em That Way!" in the June 1998 *73 Amateur Radio* magazine. In fact, with the many very real "survival problems" amateur radio faces today, educational programs may be a big part of our hobby's salvation.

Wrap-Up

That's all for this time, gang. Next time, more "Digital Dipole" topics of current interest. See you then.

Overheard: Long ago, on the air and off, I learned that good manners are always in style—*always!* 73, Karl, W8FX

CIRCLE 53 ON READER SERVICE CARD

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

More Leonids Reports

As indicated last month, space in this month's column is devoted to *Leonids* reports. Here is a sampling of more than 100 reports filed on the VHF reflector:

Mark, N7EIJ: "In one hour heard or worked WA, OR, NV, CA, UT, AZ, and CO. Worked N6RMJ, K6KLY, K7ICW, KF7NP, N7QJP, W7RV, N7WS, and NJ7A. On 144.2 I worked DM23, 14, 26, 33, 42, CM87, DN30. I heard DM98,67, CN87,84, DM54 yesterday and someone in NM which would have been a new state! Burst at 1400Z, 1433Z, 1448Z, and 1516Z, and my array was 120 deg az and 5 deg elevation. Heard NØXX at 20 over 9 in this direction; he is due south of me and was also at 120 deg."

Bert, NS4W: "I made 23 contacts in 21 grids of which 12 were new grids. Things were pretty consistent from 1300 to 1630 UTC, but judging from the log peaked between 1430–1515 on the 17th. I was rather choosy, and .200 was chaos, so could have worked far more than I did. One of the bigger problems was the huge pile-ups trying to call me from New England. I only got a few to follow my QSY. Absolute bedlam! I worked FN 00, 20, 23, 24, 41, 42, 44, 54, 55, 56, 65, FM 03, EL 87, 95, EM 25, 26, EN 25, 34, 35, 54, and 74. I heard EN28, DM58, 98, 78, EL96, and many others. I haven't worked this many new grids since '89."

George, KØFF: "I worked 20 states/22 grids and 27 QSOs. My best DX—K2RTH at 1151 miles. Heard considerable more but couldn't work it all. All randoms, 2 meters. I would say my personal peak was from 1050 to 1120 UTC with one or more pings per minute and nine complete call letters resulting in seven 2-ways. Then it looks like clusters of 1–2 minutes of activity every 10 min. or so giving a pretty smooth flow. Worked one station that I copied his call as K"B"5hhn although it may have been K"C"5hhn; my recorder messed up and some of the guys are pretty inexperienced at giving phonetics in a pile-up situation. Anyhow he was in EM11 and was *mobile!* I heard him on several exchanges, and he definitely said he was mobile, but couldn't confirm his call due to no phonetics and a southern accent. (Maybe a "word to the wise" on this to the newbies in an article?) Later, I took to my own mobile and heard KØGU, K2SMN, and others at a good solid S-7 on my Squalo/IC706 but made no 2-ways. It will be interesting to pursue this further on a serious basis.

"In all, I found this a pleasant and *fun* shower, and quite easy to make contacts. Compared to *Perseids*, I feel there was a sharper, more defined peak and that signals, when "in," were much stronger and lasted longer. The expected longer range due to more energetic/higher altitude ionization activity did not materialize for me, and distances compared very close to the *Perseids*.

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6625; fax 405-528-0746)
e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

Feb. 27–28	First weekend of European EME contest.
Mar. 2	Full Moon.
Mar. 7	Poor EME conditions.
Mar. 9	Moon apogee.
Mar. 10	Last quarter Moon.
Mar. 14	Moderate EME conditions.
Mar. 18	New Moon.
Mar. 21	Moon perigee. Moderate EME conditions.
Mar. 27–28	Second weekend of European EME contest.
Mar. 28	Good EME conditions.
Mar. 31	Full Moon.

**EME conditions courtesy W5LUU.*

"For all practical purposes my shower ended at 1515, but experience told me to wait it out, and sure enough after 45 minutes of silence, a lone last Whizzer dropped and gave a beautiful burn to KØGU in DN70, after all the locals had given up and started rag chewing on the calling frequency (a pet peeve of mine). Also, immediately after the shower subsided, there was a very good 6 meter opening covering east coast/New Orleans, Canada, and all the way to Nevada—all at the same time! It was as if we were under a 'bubble' and may have to do with residual ionization after the storm. My last M/S Q was at 1602 and I beat that dead horse for another 45 minutes before switching to 6, where I found a wide-open band that continued until 1820 UTC. This would be a good one for a newcomer to get his feet wet on."

Doug, K6ZX: "Thanks to VE6NA for my first Canadian, and DO20. Others heard and probably called, in no particular order: N7MLD, KG6BA, K7MAC, W7RV, N7KTJ, K6YK, and, lots louder than on tropo, John, WA6HXJ. Not as good as last year, but reasonable."

Jordan, VE2SWL/VE6: "Best DX from DO-21 W9JN at 1247 miles (2008 km) and also KE5ADX EM06, 2023 km. Good peak from 1000 to 1400 UTC. Total: 10 QSOs in 10 Grids."

Ray, N4KWX: "One new state Nebraska and grid: KØSM in EN10 during a nice 15 sec burn (tnx Andy). Finally made it!"

Larry, K6AAW: "Ran one sked and completed. Worked 15 more random. Best to east NØLL, best south WA6HXD/6 in DM23, best north VE5LY, best west Pacific Ocean . . . hi. All in all very good considering only working three last year, and working harder at it! Times:1139Z, 1229, 1239, 1300; backskater to KB6IGC! 1301, 1301!!, 1302, 1302, 1303!, 1350, 1354(NØLL), 1457, 1513, 1513, 1707, 1711, 1722, so for me, a major peak around 1300 to 1400 and a minor peak around 1500 to 1700; kinda like the charts, hi."

Chip, K7JA: "Lotsa fun this time! Made it out to NØKQY and NØLL on 144.200 random with big signals, some over 1200 miles. Also KI7WB. Nice to have a shower that actually works."

Jussie, OH5LK: "I went home (locator KP30ON) from my assignment in Bosnia on holidays to work the *Leonids*. The shower was absolutely the best that I have ever heard (have been active on ms since late 1970s). On SSB random a worked 217 complete contacts with about 150 different stations. Unfortunately, probably no new squares for me. Some signals in the distance around 2100 km were over S9 in my S-meter. The problem in my country was that the media was telling everyone to watch for the shooting stars on Tuesday evening, when in fact the shower was already over!"

Dan, AAØYN: "Things, as usual, didn't go as planned. I ended up with just 11 elements fixed to the south. I ran 1/2 inch Heliax out the window and over the roof to the little 55 ft. tower directly behind my house. I was able to get 150W to this. I contacted a few locals and did make one MS contact with W5VY in EL09, just under 1000 mi. from me in EN13. I'm not sure how Arliss, W7XU, did. He wasn't very impressed with this one either. Not many 'rocks' here in the midwest. Ed, WØSD, had 10 contacts in 8 states for 4 new grids and heard several more but couldn't connect."

John, K6YK: "I heard many stations on 144.200 on November 17th around 1500 UTC. Among them were VE2SWL/6, N7LT, KØGU, KI7WB, NØXX, W7YOZ, NØIPL, K7MAC, K7ND, and NW7O. Worked one QSO, N7EIJ CN85 (new state/grid!). This lasted until after 1700Z. This is all amazing to me! It was a mess on 144.200 every time there was a burn, but it was fun. Being pretty much of a QRPer (100 watts and 12-element KLM), any time I get a new grid or state it's a big deal! That makes 9 states and 53 grids for me so far."

Jim, W4KYX: "I have been a ham for over 20 years and have been doing VHF weak signal for only two or three years. As far as I am concerned this is it! Everything else is for sissies. I used the same strategy. No way to make any sense out of .200 when the band opened so I set one VFO there and set the other on .205. I listened to .200 for the bedlam to start then quickly switched to the other frequency and called CQ scatter like a maniac. Worked over two dozen stations this morning this way for quite a few new grids and several new states. I could have worked more but the QRM was even heavy on 144.205 MHz."

Shawn, ZR1EV: "For those wondering what is happening in southern Africa, very interesting conditions this time around during the *Leonids* meteor shower. I got up at 3 o'clock on the morning of the 17th (Monday) 01h00 UTC. 'Pings' were few and far between, but were very strong from the ZS6DN beacon on 50.050. No activity heard on 50.200. I then had a sked with Paul, ZS6PJS, at 04h00 UTC on 50.210 which took a whopping 15 minutes to complete! Two unidentified stations chose this frequency to have a bit of a chat, which made the exchange very difficult. We used the 15 second calling sequence (ZS6 – 0 to 15s...ZS1

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– 15 to 30s... ZS6 – 30 to 45s . . . ZS1 – 45 to 00s). The unidentified stations on the frequency did not seem to be either in ZS6 or ZS1, so at times we were both a bit confused. Toward the end, we discovered that these stations were slightly off frequency, and we managed to complete the contact by concentrating on sigs on exactly 50.210. Paul was using 2×11-ele long-boom Yagis (M^2) and 400W PEP. I gave him a 5/6 signal report initially, but his signal picked up to about S9 toward the end of the sked. Paul reported that my signal to him was audible most of the time, but I only managed to nudge his S-meter up to S1. I was using a 4-ele Hy-Gain Yagi and 200W from a homebrew linear. This was probably due to Paul's antennas, which have a very narrow radiation pattern that is better suited to DX and not really ideal for such short distances. Conditions were not good enough for an attempt at 2 meters. Too bad! Paul reported lots of activity in DIV6 on 50.200, but I could not hear any of them.

"At about 7:15 (05h15 UTC) signals from ZS6DN/b started getting stronger with long S5 bursts with heavy QSB. I was starting to get ready to leave the QTH when I worked the only other station on the band at the time, ZS6HS, O.M. Bert with good sigs both ways. When I left the QTH, Sigs from ZS6DN/b on 50.050 were solid S9+ with almost no QSB. I spent the next one and a half hours in the traffic wondering what I was missing.

"I arrived at a client's QTH in Sea Point at 9:00 (07h00 UTC). He was a radio dealer, so I rushed up to his first floor 'shack' and fired up his IC-726 up on 50.050. We could copy short bursts from ZS6DN/b with the preamp on and using a short 29 MHz helical whip antenna on his balcony as an antenna. I rushed back to my QTH and got back at 9:35 (07h35 UTC), but there was no sign of life, except two strong bursts about an hour apart. On the 18th of November (yesterday) the pattern very much repeated itself but with less intensity . . . no stations active. This morning (19th) there were only a few 'pings' at about 05h15 UTC. So, the shower seems to be over. The interesting thing was that in spite of a bit of a disappointment with regard to activity and the low intensity of the shower, it was still a lot better than the *Perseids* in August. See you next year?"

Gene, W3ZZ: "As usual I listened to the experts who predicted that the shower would peak between 14–18Z on Nov 17. So I did not take Monday off from work. Bad mistake. Reports indicate that Monday morning was perhaps the best time of all. The peak was apparent just before I started to operate around 05–06Z on Nov. 17, some 14 hours or more early. Second, while conditions were first rate, there was *no* meteor storm. But there were lots of *big* meteors that burned long and high and apparently supported 222 and 432 better than any other shower in recent memory. I did only one schedule with WAØBWE EN34 in MN which I completed in little more than 10 minutes on 222 on a single burst that lasted almost 15 secs. This was state #36 on 222. Only NE is left that is reasonable to think that I can work and there are no active 222 stations to work at the moment in NE as far as I can see.

"On 2 meters I worked two new grids EM43 and DM98. The latter contact was with NØKQY at 2096 km. On 6 meters randoms I had 14 contacts 0604–0630Z 17 Nov. Sounded like E-skip! Nothing interesting. On 2 meters randoms I had 52 contacts."

Joe PAØJMV in JO21PM writes: "Wow! I am glad the *Leonids* party is over! I have been QRV via 144-MS since 1968 (first 2 years as SWL), but I have *never* experienced *any* opening like this. Of course I was skeptic to all fantasies about meteor storms and damage scenarios for our telecom satellites, so in the evening of 16 November around midnight, I said to my XYL, before going to sleep, just a moment I want to have a quick look on 2 meters. . . I'll be with you in a minute. . . . When I entered the shack, I saw on FFTDSP a long carrier on the frequency of SK4MPI. That recording had been on for 2 minutes; I thought it was just a strong birdie. . . . *No*, that was MPI with S9 for 2 minutes already. So I tuned quickly down to .300 / .200 and heard some great reflections. Because I guessed that it could be a long session, I decided to run my station in the QRP mode, just to keep my neighbors as good friends, hi. So I started to work with my 12-element Yagi at 11 m/gnd and some 150W out in SSB, time was 23.15 UTC (Nov 16). As time went by, the signals became longer and stronger. Around 0300 UTC it was like 20 meters during a contest—signals from *all* over Europe. It didn't matter where I turned my antenna; sigs boomed in either via direct path or side/backscatter.

"No need to say that the QRM was just killing; many central European (mainly PA, DL) stations called CQ with high power, splattering for enthusiasm, and sometimes without listening at all. I was of course hunting for any exceptional long distances, new squares, or anything better, so I was unwilling to answer many stations that I heard, and I called maybe 10 times CQ at all. After the opening I noticed well over 200 different callsigns on the papers on my desk, with 70 stations in my electronic logbook. Nine QSOs were over 1900 km, 3 QSOs over 2000 km, and the ODX being UA3PTW at 2214 km with just S9 signals! UA3PTW was also the only new grid square (#672).

"No need to say, *all* on random of course! Only 4 QSOs in "slow speed" CW, others SSB. If I would have answered all that I heard, the number of QSOs would have been double or more! Our problem in this part of Europe is that we live in the center of activity (DL, PA, ON, G), and at the distances where we could work new stations, there is either no activity or sea. . . . The DX-cluster and the Wconvers were (again) not working here anymore. That was a good thing, so I could have full concentration on what was audible in my headphones. There was no optimum time for any direction. Between 0300–0500 UTC the band was just completely open *all* over Europe; some stations such as UT8AL, SV1OE, SVØEC, SM5BSZ, and many others were audible for 15 or more minutes with just minor dips!

"Around 0300 I went outside into the garden. The clouds had gone, and I enjoyed the visual fireworks as well, but just for 5 minutes, since I wanted to play radio. After 0830 UTC the number of reflections became far less and shorter, and I made only 2 QSOs between 0900–1100 UTC. No need to say that I was QRV in short intervals last night as well (17–>18 Nov) but I made not even one QSO! I agree with some friends on the VHF reflector who said that they would never trust any 'scientists' anymore. If you want to work DX, you *just have to be QRV always.* Do not rely on anything but your own RX and ears!

"Thanks to all for making this party possible, and see you next year *before* the predicted maximum!"

Oscar, CO2OJ: "Well, my list is not very large, but I'm very happy with the results. This is the best in my four years on VHF and two trying MS on 2m. I keep my work on 2m and no 6m QSOs were tried this time. I arrange 12 skeds and sat beside the rig for 15 hours continuously, slept only one hour (today my body reminds me that I'm getting old, hi). Of 11 skeds, 6 were completed for 4 new grids and one new country.

"Six random QSOs were made for other four new grids. Best DX WP4O, Ed, for my country (don't smile, please!) number *four* on 2m. This was the second QSO Cuba-Puerto Rico on 2m. The first one was a couple of years back be-

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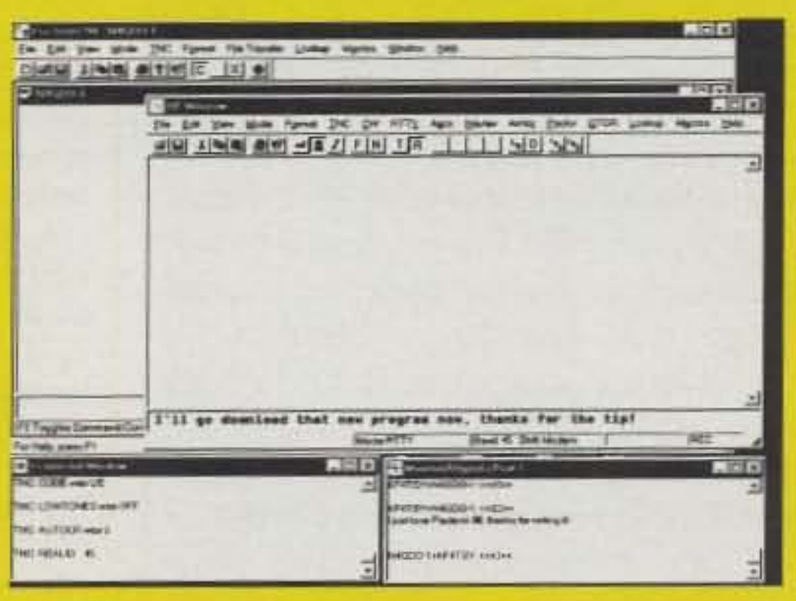

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tween CO2JA y KP4EIT on FM! Longest QSO WA8RJF, Tony, for a 2063 km shot. All the skeds were completed in only *one* burst, and most of them very fast. The longest was the one with WA8RJF that was completed on the minute 17 of a 30 minute sked. All signals were very loud and most of the bursts were long enough for the complete exchange, 73, greetings, etc., and a couple of times working another station. Lots of station from FNs grids were loud on 144.200 (their signal were over the S7 interference) on the early morning of Tuesday, but too much QRM. W3ZZ and AA8Q very loud a couple of times. My friend, WB2QLP, south Florida, was there calling "CQ Scatter" for hours. Do you still have any voice, Jordan? Maybe not the expectacular shower many predicted, but really out of the average. Thanks to the friends I couldn't work, for their time: WB1FLD, N1RWY, NU8I, K8BHZ, W4FSO. Hope to see all of them on the rocks next time."

Larry, NØLL: "By most reports the 1998 *Leonids* was the best meteor shower in modern amateur radio times. The highlight for me was working W1AIM on 2m at 1848Z Nov.16th for state #47. I have tried to work him and Dave, K1WHS, in Maine on MS several times before and had never heard a thing as it's 1400 to 1500 miles, but with the 1997 *Leonids* good and this year predicted to be better, I made a phone call to W1AIM Sunday night to discuss the possibility of playing it by ear in case the band got very good, then we'd try it again.

"There was some MS activity Monday morning which I wasn't expecting, but I had not made arrangements at work to take the morning off so I went to work. When I came into the shack at noontime Monday a MS burn at 1810Z lasted 9 minutes and 11 contacts were made in the direction of VT. So I called Chip, W1AIM, on the phone. He had just gotten in from deer hunting and said he'd be ready in 10 minutes. It took 13 minutes to complete and I wished I'd encouraged someone in Maine to be ready. However, I worked a few randoms and went back to work. Not realizing and missing out Monday morning was one of the several operating mistakes made. The peak was to be at 1900Z or so on the 17th so I made two skeds with Maine. Turns out the experts were wrong on several things and nothing was heard on those skeds. From this distance and station it looks like next year's *Leonids* may be the last chance in my lifetime to work the 48th state, Maine, on 2m. I was heard in Maine on 2m in the big E opening of July 17, 1980, but that is the last time we've had propagation in that direction. It's always south of there.

"Out of bed at 0800Z on the 17th, the *Leonids* were just awesome with even 222 randoms and a sked with VE5LY on 222 at 1000Z completed in 35 seconds. Would have been shorted but Ross started out transmitting on SSB with the button on his IC-375 in the CW position. Also two random 222 contacts in Ohio and even Los Angeles, which is a long distance. The excellent shower continued till around 1546Z when only two more contacts were made after that. I wound up with 106 *Leonids* MS contacts: 2 on 6 meters, 99 on 2 meters, and 5 on 222. For me only 4 new grids on 2m, but all 5 contacts on 222 were new. In fact I'd gone 9 years with only one MS contact on 222 until this year's *Leonids*. Thirty-three states and 3 countries were worked on 2m. Many of the contacts were on 144.195. My station is 360 watts and 14-1/2 elements on 2m and 120 watts with 11 elements on 222; 9913 coax. TNX to NØKQY for the note comparing throughout the shower."

Bernardo, XE2HWB (via N6XQ): We decided to activate DL54 for the *Leonids*. The location was Punta Arena de la Ventanna, a secluded beach about 40 miles southeast of La Paz. Operators were Antonio, XE2HWH, Bernardo, XE2HWB, and Jack, N6XQ. We arrived the evening before and set up camp and visually observed many meteors.

"We completed only 4 of our scheduled 13 stations: N6CW, NJ7A, N7STU, and NØIPL. We heard bits and pieces out of NØJK, lots out of W5UWB where he was not hearing us well because of the power differential, and a little out of NU8I. The good news is that we worked a few on randoms. N5WS, N6YM, N6CA, K7ICW ??, WB6NOA, WA6JBZ, and KJ6HI.

"We should have started earlier than 1400, as stations were very loud at the start. Thanks to all who showed for the event. We had a blast and the beach was great for snorkeling. *Adios* from the La Paz gang."

Robert, N7STU: "Last year I only worked two stations on the 16th around 14Z with very little heard any other time (compared to nine this year). Had many more completions on the 17th last year (16 Q's vs. 11 Q's). Last year the shower was usable here from 1130–1700Z. This year yielded more than 3 hours of activity on the 16th and more than 10 hours on the 17th. Farthest heard was W7XU @ 2070 km who was in frequently, but farthest worked was only around 1750 km. Next to last contact before things died out was grid #100 for me!

"The NØEC beacon was an invaluable resource during the shower. Most of the time my second receiver was parked here listening for signs of rocks, or tuning the bands looking for CQers. I wouldn't have made several of the contacts I did if this beacon was not on the air.

"I noticed the following peaks: 16/11 1430–1630Z; 17/11 0720–1000Z; 17/11 1300–1700Z (things dropped off very rapidly after 17Z). There was never a definite peak like last year; conditions seemed pretty constant throughout the period. Very few pings and lots of 30s to 2+ minute bursts. My opinions may change after I get a chance to review the 12 hours of audio tape starting at 09Z on the 17th and compare to last year's tapes."

Early New Year VK and ZL Openings

Dave Batcho, N5JHV writes: "Last evening (Jan. 2 UTC) I managed to work three VK2's between 0155Z and 0210Z. This occurred after a prolonged (4+ hours) intense opening to the west coast of XE. I'm not sure whether the E-cloud spread enough to catch the Pacific TE, or the TE finally got good enough to hit the E-cloud. Signals from VK were quite weak; VK2DN on CW, and VK2FLI and VK2ZHE on SSB. I don't know grids, working conditions, etc., about these stations. I understand that WD5K also worked VK2DN, but I've heard no other reports. About ten minutes prior to the first contact, the 46.240 VK video just popped up out of nowhere. I believe this transmitter is located in QF35, right in the heart of VK2-land. 46.172 up in QG53 (VK4-land) was not heard. All signals were on the direct path.

"The most incredible thing about this opening is that it took place almost precisely 365 days later from a very similar opening on Jan. 2, 1998 between 0030Z and 0130Z. In that opening the

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propagation did not quite get to me, but several south Texas stations worked ZL and VK. Similarly, that opening took place right after/during a strong opening to the XE West Coast."

"Then on Jan. 9, 1999 Dave wrote: "Worked VK4KK and VK4APG and my first Tasmanian, VK7GK. ZL video and audio very strong here."

Ron, K5LLL, writes: "Worked VK4AFL, VK4APG, and VK4KK on 6m frequencies ranging from 50.107 to 50.170 between 0220Z to 0300Z. Sigs were 5×3 at best on SSB and 529 on CW for VK4KK. VK4APG, Peter, was in QG62lp. Running 100 watts to 6-el beam at 40 ft. Good to hear six open for DX again."

Jack Henry, N6XQ, wrote: "It's very interesting the different footprints we were having. In San Diego, DM12, I had VK2's instead of the VK4's. Worked VK2TWR, VK2DN, VK2VC, VK2XK, VK2FLI, VK2APG, VK2GN, and VK9VS. All SSB except VK2DN. Wasn't the pegging-the-meter type opening. I had to struggle with some of the calls and reports because of high QRN. I could hear others calling, but they were just at the threshold. The VK9VS reported to be in Norfolk Island could have been Jim, VK9NS. I was fairly sure of the 'victor' phonetic, but I can see with the QSB how if I missed the first syllable on 'November' I may have mistaken it for Victor. Wouldn't be the first call I messed up."

On 11 January, Mike, ZL3TIC, wrote that he worked W5UWB.

Current Contests

The following is via Ian White, G3SEK:

European Worldwide (EU WW) EME Contest 1999: Sponsored by REF and DUBUS, the EU WW EME contest is intended to encourage worldwide activity on moonbounce. Everybody can enter. Multipliers are DXCC countries plus all W/VK/VE states/provinces/territories. This gives equal chances for stations from North America, Europe, and Oceania. The rules reward random QSOs, but do not penalize skeds on 2.3 GHz or above.

1. Contest Dates and Periods: The contest occurs during two full weekends: 144 and 1296 MHz on the February weekend, and 432 MHz and all other bands on the March weekend. Each weekend of the contest begins at 00:00 UTC on Saturday and ends at 24:00 UTC on Sunday.

2. Bands and Dates: First weekend 144 MHz and 1296 MHz 27/28 February 1999. Second weekend 432 MHz, 2300 MHz and above 27/28 March 1999

3. Sections: QRP 144 MHz <100kW EIRP; 432 MHz <400kW EIRP; 1296 MHz <600kW ERP; >= 2300 MHz no separate QRP/QRO categories; QRO On 144, 432, and 1296 MHz, stations with EIRP equal to or greater than stated above. PRO Non-amateur equipment or antenna. PRO stations will have scores listed separately. There are no separate multi-operator classes. Multi-operator and QRO stations will be highlighted in the general classifications.

4. Exchange: Callsigns + TMO/RST + R.

5. Scoring: 100 points for each random QSO completed. Ten (10) points for each sked QSO completed on bands below 2.3 GHz. One-hundred (100) points for each sked QSO completed on 2.3 GHz or higher bands.

6. Multipliers: Each DXCC country (except W/VE/VK), or *each individual state* worked in W/VE/VK. Multipliers count only if worked by Random (except on 2.3 GHz or above). States and provinces can be determined after the contest using address lists in recent newsletters or in DUBUS.

7. Total scores: Single band entries—sum of points multiplied by sum of multipliers. There will be one QRP winner and one QRO winner on each band. Multiband entries—(Total sum of points on all bands) * (total sum of multipliers on all bands). There will be one QRP multiband winner and one QRO multiband winner. Multiband stations will also be listed as an entry on each separate band worked, and can also win single-band awards.

10. Reporting: Copy of the log for each band with details of points, multipliers, and total points. The following information *must* also be included for each band:

1. Output power, transmit cable loss, antenna type and gain.
2. Working category: QRO/QRP single/multi operator.
3. Name(s) and signature(s) of all operators.
4. Locator/State.

Other information is welcome: comments, conditions, grid locator, other station details, photographs, etc.

11. Awards: A certificate will be sent to each entry. All QRP/QRO band winners and QRP/QRO multiband winners will receive a trophy. In each section, the highest-scoring station in the Southern Hemisphere will receive a special certificate.

12. Logs: Log entries must be postmarked no later than 30 days after the end of the second weekend (i.e., in the mail or e-mail by 27 April 1999) to the following address: DUBUS Verlag, EME Contest, P.O. Box 500368, D-22703 Hamburg, Germany (fax: (++49)40-8508972). You can also e-mail your log directly to <dubus01@ibm.net>. All e-mail entries will be acknowledged within one week.

13. Referee: Responsible for rules and general questions is: Ian White, G3SEK, 52 Abingdon Rd., Drayton, Abingdon, Oxon OX14 4HP, England (tel.: (++44)1235-531559; e-mail: <g3sek@ifwtech.demon.co.uk>.

***CQ VHF* Introduces Three "Spring Activity Weekends":** Our sister publication, *CQ VHF* magazine, has announced the introduction of three VHF "Activity Weekends" in the spring of 1999. These weekend-length events are intended to promote activity on the VHF and UHF bands during the slow spring season and to generate interest in VHF contesting among a wide variety of ham radio operators.

The event will be divided into three mode-based weekends, one each month during March, April, and May. First up is the *CQ VHF* "FM Activity Weekend" on March 19–21, followed by the "Weak Signal Activity Weekend" for SSB and CW operation on April 23–25, and closing with the "Specialty Modes Weekend" on May 21–23. The latter event will be for packet and other digital modes, amateur television, etc. All bands above 30 MHz may be used for the event, which will start at 6 PM local time on Friday and run through local midnight Sunday.

Each weekend will be broken up into 6-hour blocks, with stations permitted to rework each other in each separate time period. This will not only encourage activity, but will allow the station with limited operating time to compete against others in the same time category. Exchange will be callsigns and grid squares. Experienced VHF contesters are urged to operate during the FM and specialty mode weekends as well as the weak-signal weekend, in order to set examples for proper VHF contesting procedures and help stations new to contesting to determine their grid squares.

Top-scoring stations in each US and Canadian call area, plus each DXCC country from which a log is received, will be recognized. Organizations or individuals wishing to sponsor plaques should contact *CQ VHF* for more information. The event will be administered by VHF contesting veteran Gordon Beattie, W2TTT.

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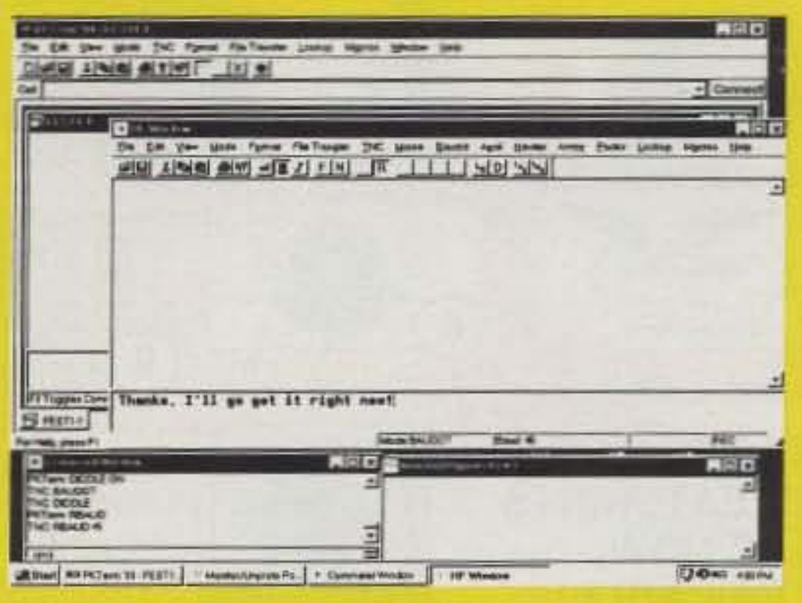

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ARRL Drops Spring VHF/UHF Sprints

The following is from the *ARRL Letter*, January 8, 1999: "The VHF/UHF Spring Sprints—traditionally held during April and May—have been dropped from the ARRL contest schedule. ARRL Contest Branch Manager Dan Henderson, N1ND, cites a lack of participation for the change. "Participation in the VHF/UHF Spring Sprints has never reached the level of a healthy national event," he said. "In 1998 only 200 individuals submitted logs spread across the seven frequency bands covered by the Sprints."

Henderson said budgetary constraints were another factor. "With the soaring costs and limited space available in *QST* and *NCJ*, the 1998 Sprint results were moved and made available to all on ARRLWeb," Henderson said. "We hate to drop the contest and would be willing to work with another group who would like to pick up sponsorship and running the sprints." But he said the League could not justify a decision to continue to devote staff time to a small event when it already sponsors several other more significant VHF/UHF events.

Many VHF/UHF events remain on the ARRL Contest schedule. These include the January VHF Sweepstakes, the June VHF QSO Party, the August UHF Contest, and the September VHF QSO Party, plus two 10 GHz and Up weekends in August and September, and the popular EME contest weekends each fall. Also, Field Day offers opportunities for VHF/UHF participation, Henderson pointed out.

Now the good news: Your columnist is willing to use this column as a venue for reporting the scores of a reconstituted Spring Sprint contest. Please note that neither your columnist nor *CQ* magazine is agreeing to sponsor the contest. We are merely willing to provide a place for the scores to be published providing that a responsible group comes forward to take over the running of the contest from the League.

N6XQ to CP

Jack made the following announcement via the VHF reflector: "Several have been asking about my trip to Bolivia. I will be in CP 15 through 30 March and will be very active on 6 meters, 500 watts and medium size beam." Watch for more up-to-date information on Jack's trip to be posted on the VHF reflector.

Mark, KC5FMT, SK

Mark Vaglienti, KC5FMT, was fatally injured in a single motorcycle accident in Mexico in December. It is reported that he was on his way to renew his Mexican license. Mark and his wife, Barbara, KC5FMU, activated many rare Mexican grids on 6 and 2 meters and 70 cm. The VHF+ community will sorely miss him.

New E-Mail Address and URL for Your Editor

Effective immediately, my e-mail address is <n6cl@fuller.edu>. My home page URL is <http://private.fuller.edu/~n6cl>. My graduation from Perkins School of Theology last year has necessitated me giving up my SMU e-mail privileges. Now that I am a doctoral student at Fuller Seminary, I have access to their e-mail privileges. As I will be working on my DMin for the next five years, I will also have that address for that length of time. Please correct your records and links to show these changes.

And Finally . . .

This has been a busy and informative column. There's lots of stuff going on in our wonderful world of VHF+. The League's decision to drop the Spring Sprints brought out a lot of discussion on the VHF reflector. Some of the discussion centered around trying to keep from losing amateurs from our ranks and trying to encourage those who are most predisposed to operating on the weak-signal frequencies, the Techs and Tech Pluses, to try them out.

This is a subject not unfamiliar to your columnist. It seems that at times we are our own worst enemy. I was pleasantly surprised to receive so many requests for reprinting a tale of the "Good Samaritan Ham" that I published a while back. For those of you who have not read it, I will republish it in a future column (I am already over my max in word count for this one). In the meantime, I reiterate what I have said here so many times before: If we want people to stay, we must make them welcome. If in front of you are two signs, each on a separate door, one that says Welcome and another that says Keep Out, which door will you go through? It's the same for those whom we are trying to recruit. Let's put up the Welcome sign and throw away the Keep Out sign. Until next month . . . 73, Joe, N6CL

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BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Packet Radio for the New Millennium

Once upon a time, a long time ago (prior to 1985), I authored a column in another magazine. The column in that magazine was called "Converse and Transparent." I—that is, "we"—were into "CoCo's" (Tandy/Radio Shack Color Computer™). The CoCo and a program appropriately called "GraphiCom" enabled us to draw or enter a crudely scanned picture and send it to a connected station.

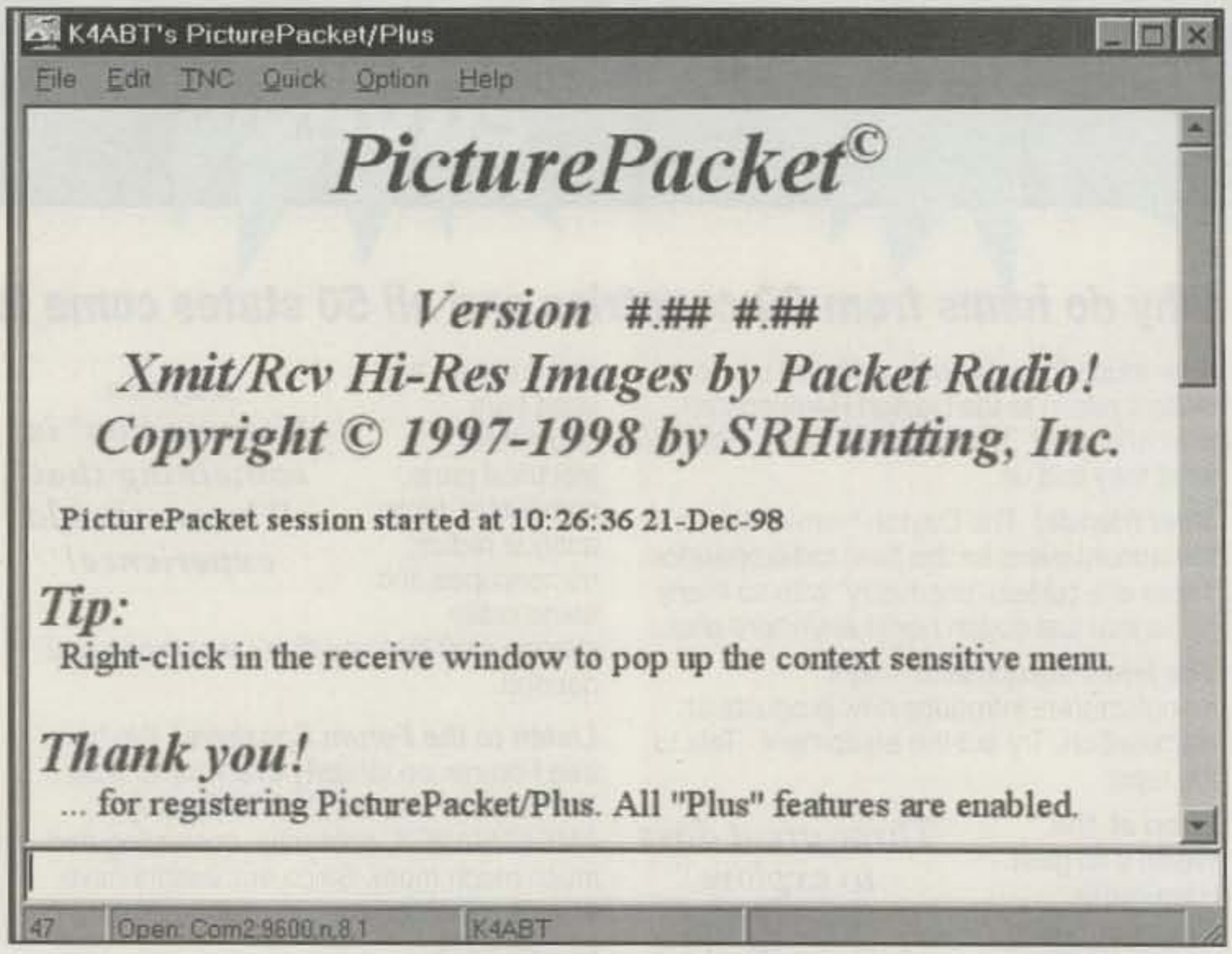

Fig. 1– The opening screen with the PicturePacket main menu (toolbar) display. As soon as this window is displayed, the TNC setup follows. For convenience of the operator, this entire PicturePacket window may be moved anywhere on the desktop. The screen can also fill the complete screen. Screen size is the option of the PicturePacket user.

DIT and DAT

"Oh no, Buck's at it again, but this time, *big time!* Maybe Buck has a limited vocabulary or something." The story is long, but I'll make it short.

In 1983 I copyrighted and trademarked the DIT and DAT process while using the CoCo to send and receive pictures and sound. In the early days of DIT and DAT, we encountered several obstacles, one of which was the slow transfer between stations. Another obstacle was the poor quality of the audio, as I had used a proximate sampling method to keep the audio files short. The result was a "reasonable" facsimile (barely recognized) of the original voice.

The picture generation was still another story, with problems similar to those I used for audio recovery. In addition, the pictures were colorless or were displayed in "artifact" (four basic colors) and were difficult to generate. The pictures were in "color"—that is, they were in what we referred to as "artifact" colors. Our GraphiCom software in those days rendered only four (artifact) colors: red (a sort of pink), blue, black, and white. For those who may not be familiar with the term "artifact color," artifact colors are colors that may represent several other colors within a range of colors. For instance, a pinkish red might represent colors of red, yellow, pink, cyan, and orange. Blue would fill in for turquoise, purple, violet, and maybe even brown. Anyway you get the "picture."

Since 1983 we made do with whatever means we had to make and send pictures. Prior to 1983 some of us resorted to using RTTY (Remember the model 19,.etc.?) to send a set of many long lines and letters arranged in such a manner as to appear as a graphical form, or dither of a picture. of sorts. These by no means were pictures, but they did give some semblance of an artistic "illustration."

211 Luenburg Drive, Evington, VA 24550
e-mail: K4ABT@PacketRadio.com

Digital History is Made!

Voice and Picture Integration via Packet Radio

Today we've set a new packet radio milestone as we send and receive high-resolution pictures and audio via packet. The formats for these digital modes (voice and pictures) are universal formats that are available to anyone who uses the PC or compatibles.

"Digital Image Transfer" (DIT) and "Digital Audio Transfer" (DAT) are not new. It is the technique and procedures we are using today that is new.

For several weeks now, in December, I've sent (and received) several digitized voice messages via packet radio at 9600 baud. and through 9600 baud nodes to target stations. The sound is a digitized voice message of Season's Greetings from me, K4ABT, and my wife, Jean, WB4EDZ. The digitized message is easily recorded on any PC with a sound card in WAV format. This message is about 15 seconds in length (you can say a lot in 15 seconds). The file is quickly compressed into an MP3 file with a frequency response of about 8000 Hz, and the file length is just under 11 Kb. The transfer of this message to the target station was less than one minute.

The ability to send and receive digitized audio is an added enhancement to the PicturePacket terminal program, the "brain-child" of Stan Hunting, KW7KW. With PicturePacketPlus, we have the capacity to send and receive high-resolution digitized pictures (DIT). Stan has now added the digital audio transfer (DAT), which is an enhancement to the PicturePacketPlus software (see PicturePacket opening screen, fig. 1).

Most of the "alpha testing" took place during 1998. Now in 1999 the process is

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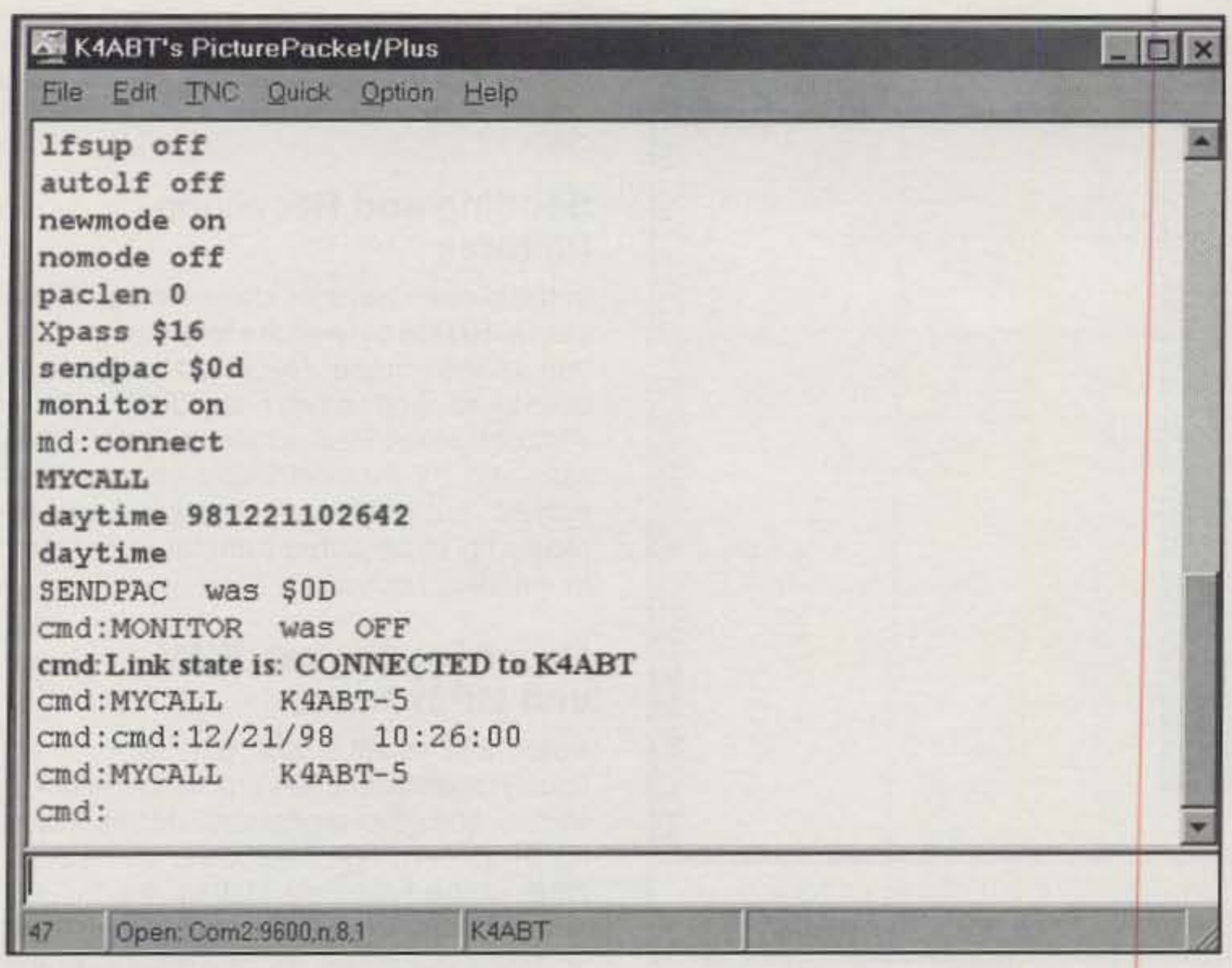

Fig. 2– The receive window is a history of what actual occurred and should not be edited. The receive window is a perpetual, scrollable history of all incoming and outgoing communications. The contents of the receive window are saved to disk at program exit and reloaded at program startup. The amount of saved history is determined by the history settings (filename.hst).

refined to the point where we are ready to send and receive these "Digital Image Transfers" and "Digital Audio Transfers" in an integrated format to and from a target (connected) packet radio station in near real-time.

When the audio (or picture) is received at the target station, it is automatically played (displayed) through the connected station's sound card speaker (or displayed on the screen). When receiving an audio file, you can hear the message if you have a sound card and software that supports WAV and MP3 digital audio—for example, WinAMP, MPlayer, etc. The MP3 DAT is the format we use to send via packet. The reason we use the MP3 format is because the original (voice) WAV files are compressed to one tenth of the original size. The MP3 audio file maintains good fidelity and decreases the transmit time to a minimum. A digital voice (DAT), 20 second (voice) file takes about 1 minute to transfer at 9600 baud.

Talking To Your TNC

PicturePacket supports TNCs operating in terminal mode (see the example screen in fig. 2). Terminal mode is defined by the feature set and functionality of the original TAPR TNC-2 design. Most TNCs operate by default in this mode with various proprietary extensions.

Terminal mode expects a great deal of operator input and control. It does not require a computer or any computer software—thus the name *terminal mode*. The TNC will work just as well when connected to a "dumb" terminal.

Indeed, terminal mode was not a part of the original design for computer-to-TNC communications. While many terminal mode control programs do attempt to automate various operator functions, PicturePacket opts for reliability by focusing on just those tasks where real value can be added at little risk of ambiguous results. Therefore, your TNC documentation should be your primary operating guide.

For example, there are no PicturePacket automatic commands to connect to or disconnect from another station. You do this using the standard terminal mode procedure. This also means that PicturePacket does not attempt to determine whether your TNC is in command mode, conversation mode, or transparent mode, the three sub-modes of terminal mode. Instead, it provides you with the Command Mode and Konversation Mode commands and forces transparent mode whenever requested to initiate a binary, picture, or digital audio file transfer. When in transparent mode, PicturePacket ensures data integrity for the duration of the transfer operation by locking the send window.

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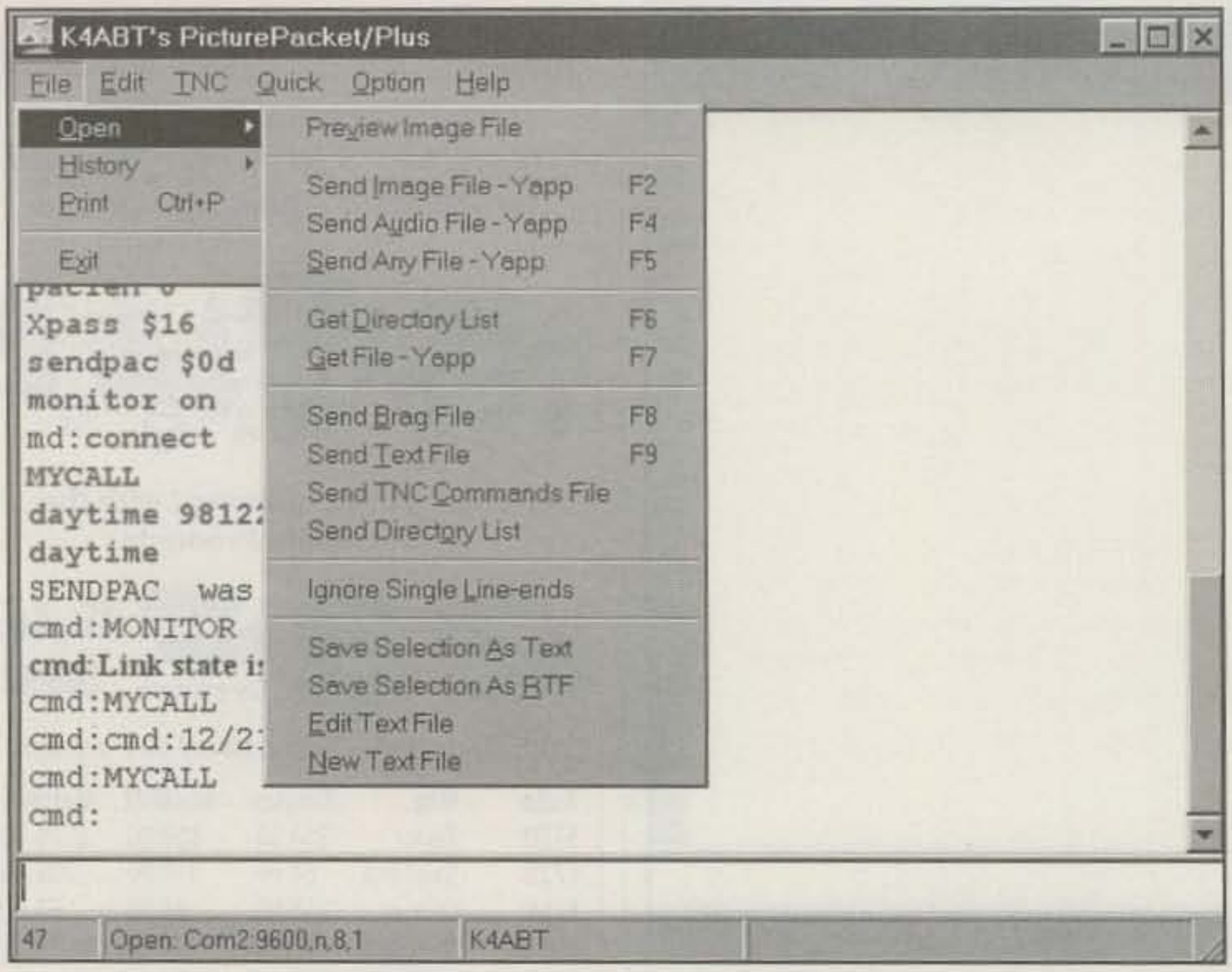

Fig. 3– Toolbar File Menu Open displays the file transfer submenu, including commands to send and receive image, binary and text files, and commands to open text files for editing. File/Open/Send AudioFile is a custom version of the general send Yapp function that looks for .WAV and .MP3 files. This shortcut and the File/Open/SendImageFile uses function key <F2>. History allows the contents of the receive window to be carried forward from one session to the next. Save History on Exit, a toggle, saves the contents of the receive window to a file. Load History on Startup, a toggle, preloads the receive window with the previously saved history file. Limit History Size determines the number of lines of receive window contents that will be saved to the history file. "No Limit" is an option. Note: Receive window scrolling performance will suffer at some point, determined by system speed, load, and available memory. Print prints the contents of the receive window. To print only a portion of the text, select that portion of the text to be printed before using this command, then click on Selection in the Print Range box of the Print dialog. Exit closes the serial port and ends the PicturePacket session.

A feature that is very useful in many ways is the virtually unlimited scroll-back buffer, or "History" feature (fig. 2). PicturePacket is unique among terminal programs with this feature. The receive window is a history of what actual occurred and should not be edited. The Receive Window is a perpetual scrollable history of all incoming and outgoing communications. The contents of the receive window are saved to disk at program exit and reloaded at program startup.

By default, the history is limited to 2,000 lines, but limits from 1,000 to 16,000 are user selectable; there is also a "no limit" setting (I hope you have a lot of memory.. and disk space.). Also by default, the history is saved each time PicturePacket exits and is reloaded on the next startup. Therefore, each PicturePacket session is linked to the previous sessions, and interesting items from a QSO that happened yesterday, or a week ago, can quickly be copied and pasted into the transmit window to forward in a current QSO. History limits greater than the default 2,000 should be recommended only to users with fast systems (Pentium 200 MHz and above), fast graphics adapters, and lots of memory.

Because the space in this column is limited, I'll set up a simple outline of the main toolbar menu topics, and I'll provide a screen window shot of the "FILE" open to provide an example of the toolbar topics.

The toolbar drop-down menus topics are:

• **File** includes send, receive, and save files, history parameters, and print command (see fig. 3).

• **Edit** includes select, copy, paste, find, recall, and clear commands.

• **TNC** includes TNC COM port open/close, configure, and special characters.

• **Quick** includes Quick keys, Quick variables, organizer, and callsign database lookup.

• **Option** includes configuration options, callsign database selection, and user registration.

• **Help** opens the help file in Windows Help.

Sending and Receiving Pictures

In the picture transfer shown in fig. 4, I've sent a 10,000 byte photo to the target station in one minute. Received images are displayed and saved as disk files in PicturePacket/Plus mode only. Images received by PicturePacket/Lite are displayed but not saved. The sending and receiving of an audio transfer is handled in a similar fashion.

Receiving Digital (WAV and MP3) Audio

Automatic receive and playback of full fidelity *digital audio* files is possible in WAV, MP2/3, and other digital audio formats (see fig. 5). When a digital audio transfer is complete at the receiving station, the file will automatically execute and run. The speech or digital audio will be heard through the sound system of the receiving station's sound card and speaker(s). A sound card and audio player such as Windows Mplayer or software similar to WinAmp (see fig. 5) must also be active on the PC.

Digital audio files are sent in the same manner as any binary file transfer. The receiving station is responsible for the execution and playback of the digital audio data. An extension of WAV or MP3 triggers a filter/trap string in the PicturePacket terminal program/software that causes other active software to automatically run and play back the sound.

Editing Text Files

I've only touched on a few of the many features of the PicturePacket software. However, there is one other item, or feature, that I feel is worthy of mention here. The contest or field day operator will love this easy to use feature of PicturePacket.

In the Windows environment it is no longer necessary (or desirable) for every program to provide its own text editor. Instead, PicturePacket provides a quick way to open a new or existing file with the program (editor) associated with the file's extension. File associations are user settings and are managed by Windows.

Edit Text File opens the selected file with the associated program (use the Windows Explorer to set or change program associations, as needed). The File/Open drop-down menu includes filters for Text, Brag, and TNC files.

New Text File opens a new file with the program associated with the filename extension, .TXT. By default, this is the Windows program, Notepad. The file is opened with the filename NEWFILE.TXT.

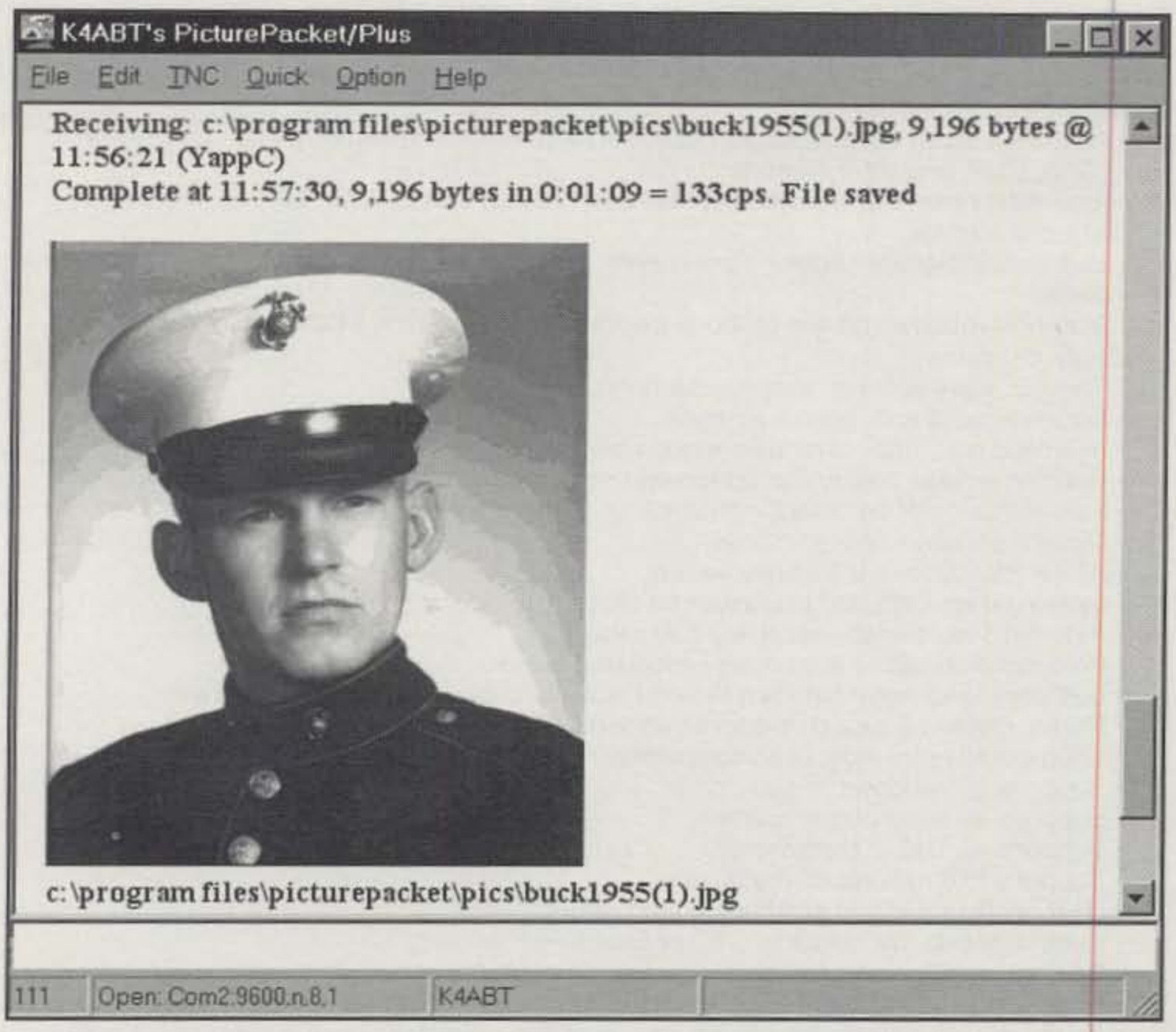

Fig. 4– In this picture transfer I've sent a 10,000 byte photo to the target station in one minute. It's a picture of a young chap I knew in 1954. Received images are displayed and saved as disk files in PicturePacket/Plus mode only. Images received by PicturePacket/Lite are displayed but not saved.

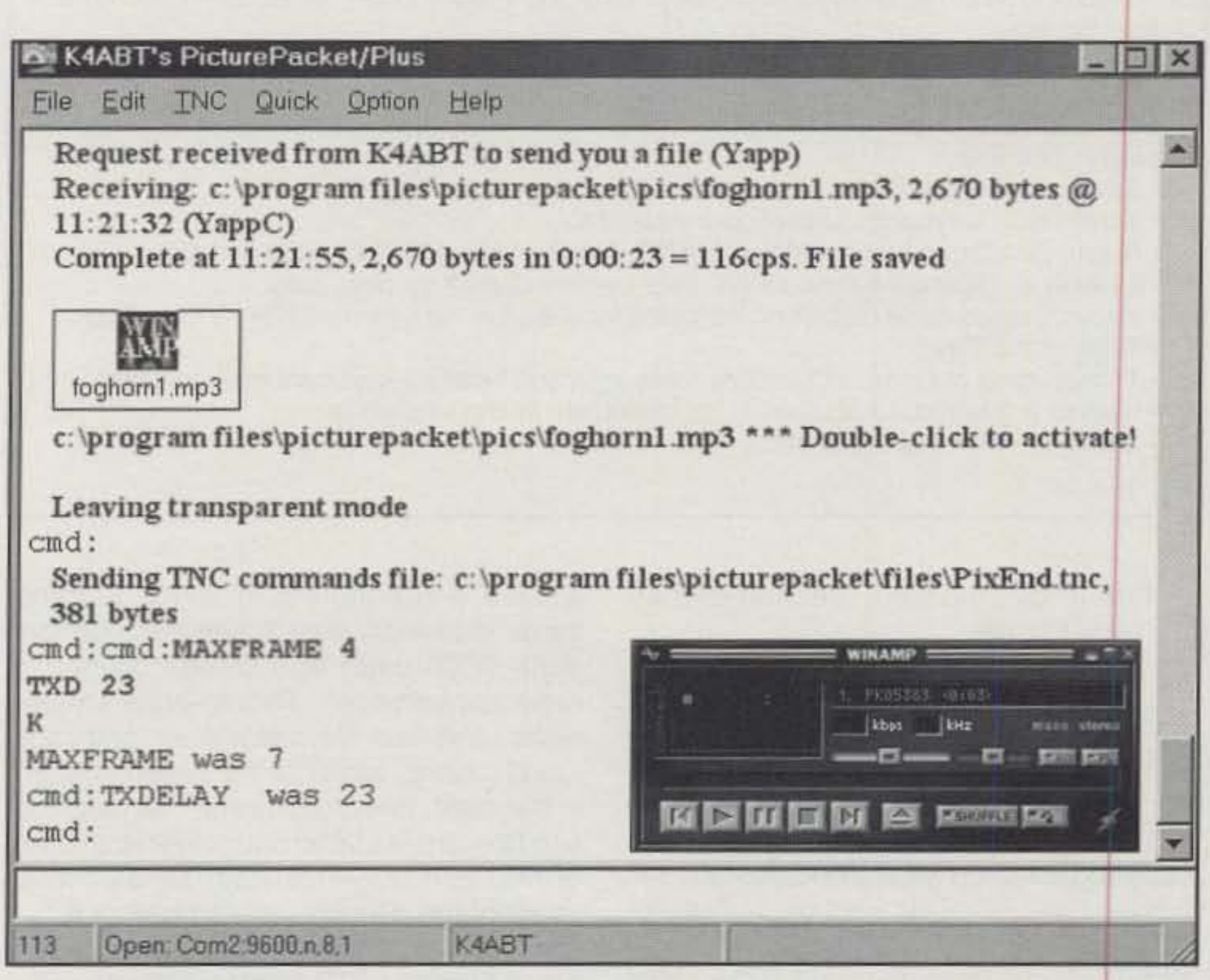

Fig. 5– A screen display of the auto-executed WinAmp™ software to enable the just-received digital audio file to be heard. Automatic receive and playback of full-fidelity digital audio files in WAV, MP2/3, and other digital audio formats. When a digital audio transfer is complete at the receiving station, the file will automatically execute and run. The speech or digital audio will be heard through the sound system of the receiving station's sound card and speaker(s).

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BP-173 pk. (5w)	9.6v	700mAh	$49.95
BC-601d	Rapid/Trickle Charger		$54.95
For ICOM IC-W21A / 2GXAT / V21AT (Black or Gray)			
BP-131xh (NiMH)	7.2v	1500mAh	$39.95
BP-132s (5w NiMH)	12.0v	1500mAh	$49.95
BC-601e	Rapid/Trickle Charger		$54.95
For ICOM IC-2SAT / W2A / 3SAT / 4SAT etc:			
BP-83 Nicd pk.	7.2v	600mAh	$23.95
BP-83xh NiMH pk.	7.2v	1500mAh	$39.95
BP-84x NiMH pk.	7.2v	1700mAh	$43.95
BC-79A	Rapid/Trickle Charger		$52.95
For ICOM 02AT etc & Radio Shack HTX-202 / 404:			
BP-8h pack	8.4v	1400mAh	$32.95
BP-202s pk (HTX-202)	7.2v	1400mAh	$29.95
IC-8	8-Cell AA NiCd/Alkaline Case		$15.95
BC-350	Rapid Charger		$52.95
For YAESU FT-50R/ 40R/ 10R:			
FNB-47xh (NiMH)	7.2v	1800mAh	$49.95
FNB-41xh (5w NiMH)	9.6v	1000mAh	$49.95
BC-601c	Rapid/Trickle Charger		$54.95
For YAESU FT-51R / 41R / 11R:			
FNB-31 pack	4.8v	700mAh	$31.95
FNB-38 pk. (5W)	9.6v	700mAh	$39.95
BC-601b	Rapid/Trickle Charger		$54.95
For YAESU FT-530 / 416 / 816 / 76 / 26:			
FNB-26 pack (NiMH)	7.2v	1500mAh	$32.95
FNB-27s (5w NiMH)	12.0v	1000mAh	$45.95
BC-601a	Rapid/Trickle Charger		$54.95
For YAESU FT-411 / 470 / 73 / 33 / 23:			
FNB-10 pack	7.2v	600mAh	$20.95
FNB-11 pk. (5w)	12.0v	600mAh	$24.95
FBA-10	6-Cell AA case		$14.95
BC-601a	Rapid/Trickle Charger		$54.95
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EBP-36 pk (5w NiMH)	9.6v	650mAh	$36.95
Packs for ALINCO DJ-580/ 582/ 180 radios:			
EBP-20nh pk.(NiMH)	7.2v	1700mAh	$32.95
EBP-22nh pack (5w)	12.0v	1000mAh	$36.95
EDH-11	6-Cell AA case		$14.95
For KENWOOD TH-79A / 42A / 22A:			
PB-32xh pk.(NiMH)	6.0v	1000mAh	$29.95
PB-34xh pack (5w)	9.6v	1000mAh	$39.95
For KENWOOD TH-78 / 48 / 28 / 27:			
PB-13x (original size, NiMH)	7.2v	1200mAh	$34.95
PB-13xh pk.(NiMH)	7.2v	1500mAh	$39.95
BC-15A	Rapid/Trickle Charger		$54.95
For KENWOOD TH-77, 75, 55, 46, 45, 26, 25:			
PB-6x (NiMH, w/chg plug!)	7.2v	1200mAh	$34.95
PB-8 pack (5w)	12.0v	600mAh	$32.95
NEW for ADI radios:			
ADI-600x (5wNiMH)	12.0v	1000mAh	$39.95

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What is PicturePacket?

• PicturePacket is a Windows95/NT control program for Terminal Node Controllers (TNCs). Features include:
• Automatic receive and display of full-color, high-resolution, digital photos and images in GIF, JPG, BMP, and WMF formats.
• Automatic receive and playback of full-fidelity audio files in WAV, MP2/3, and other digital audio formats.
• Built-in Grid Square Locator. Simply enter geographic coordinates and the grid locator is calculated.
• Supports your own on-line callbook as downloaded from the FCC or other commercial Callbook database.
• Familiar, easy-to-learn, easy-to-use Windows™ interface.
• Separate send and receive windows.
• Unlimited scrollback of receive window history.
• Receive window history carried forward from one session to the next.
• Fully Windows™ compliant interface.
• Context sensitive pop-up menus.
• All file operations are Network Aware.
• Optimized for keyboard users with no difficulty to dedicated mouse users.
• Automatic word wrap—receiving and sending.
• Print received text to any printer—local or network.
• Cut, copy, and paste between PicturePacket and other Windows™ programs.
• Find command to search the received text.
• Short-cut keys for most used commands.
• Supports all Windows™ serial ports.
• Supports all serial port properties.
• Supports all TNC-2 compatibles.
• Supports international character sets.
• User configurable text and background colors.
• Optionally sets TNC clock to UTC or local time.
• Context sensitive on-line help.
• Updates available from the World Wide Web.
• No charge, no registration license for use of PicturePacket/Lite in the Amateur Radio Service.

Those who register gain access to more advanced, PicturePacket/Plus features, including:
• Advanced support of popular callsign databases.
• Send and save high-resolution digital photos and images in GIF, JPG, BMP, and WMF picture formats.
• Send and save digital audio in WAV, MP3 sound formats.
• Send and receive documents, programs, and other binary files.
• Send Brag files.
• Send Text Files.
• Save or append selected text to a file.
• Send TNC Commands to configure your TNC.
• Automatic startup and shutdown of TNC Command files at TNC open and close.
• 24 easy-to-organize function keys, user-defined QuickKey messages.
• Instantly redefinable QuickKey Variables for the other op's name, QTH, WX, and your Message-of-the-Day.
• 17 macros to customize QuickKey messages and facilitate keyboard conversation.
• Macros are keyboard-accessible for immediate in-line expansion.
• Quick, easy on-line registration.

Be sure to give the file a real name when you save the file.

Now You Can Experience Sound and Pictures via Packet

I've just released a new CD ROM for the PC with the PicturePacket (LITE) program ready to install on your Windows 95, 98, or NT-based PC. This version of PicturePacket is the full-featured version, with the "SEND" Audio, Pictures, and Binary files feature inhibited. Once the software is registered, the program is opened for all features to be active, send and receive.

In addition to the PicturePacket software, I am including on the CD ROM many of my articles and hundreds of TNC- to-transceiver drawings, transceiver modifications (both 9600 baud and some commercial radio conversions), TNC-to-node conversions, and text file transceiver and radio modifications. Many of the documents are in Microsoft WinWord format. All modification files are in text format. Here is a library of files and drawings from almost fifteen years of the "Packet User's Notebook."

Most of the illustrations and drawings are in GIF and JPG format. These are the formats supported by the PicturePacket software and they may be sent and received just as the other formats supported by PicturePacket. A complete user's manual for PicturePacket is included on

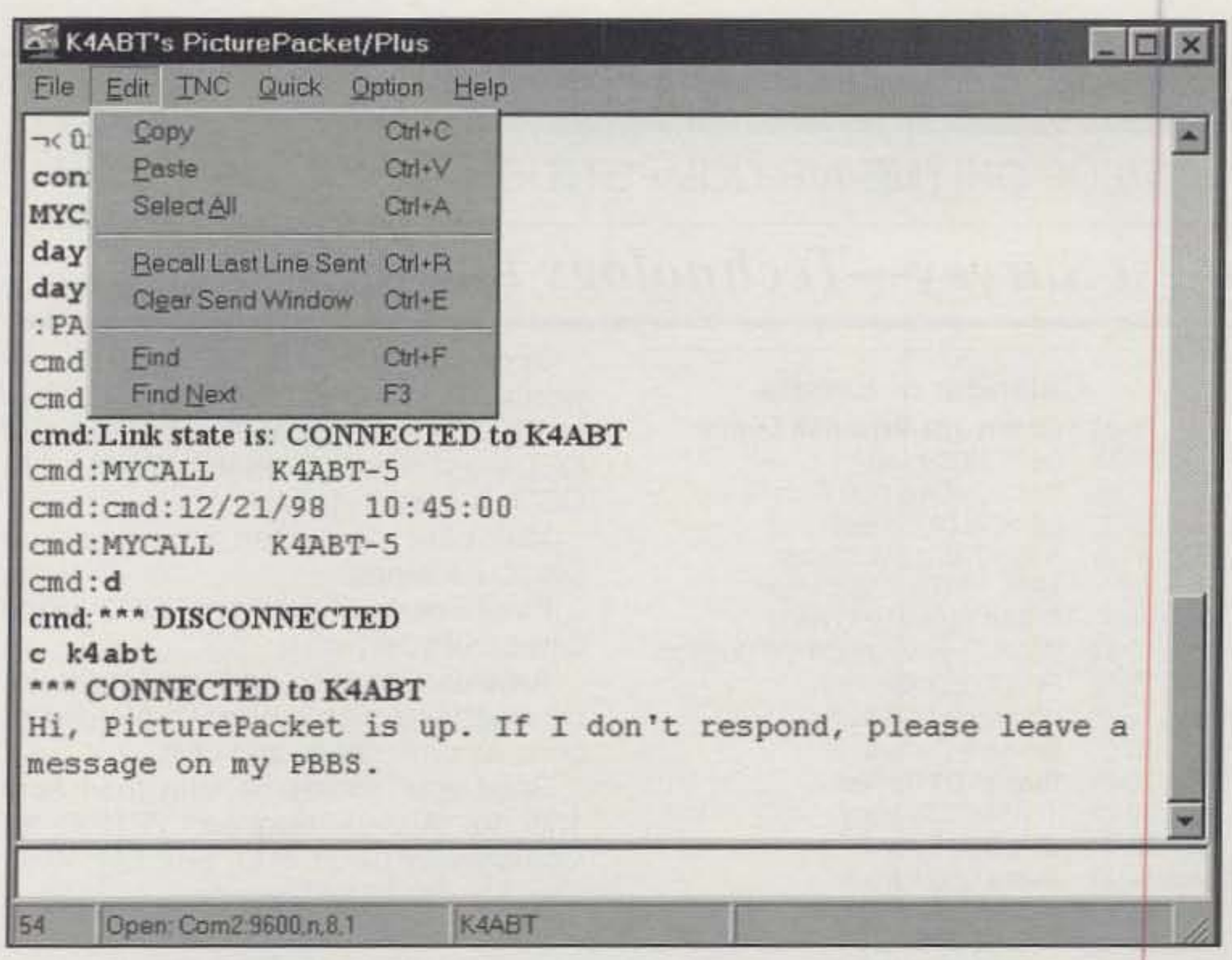

Fig. 6– In the Windows™ environment it is no longer necessary (or desirable) for every program to provide its own text editor. Instead, PicturePacket provides a quick way to open a new or existing file with the program (editor) associated with the file's extension.

the CD ROM in Adobe Acrobat™ "PDF" format. An installable version of Adobe Acrobat™ Reader© is also included on the CD ROM.

The cost of the CD ROM is $20. This *includes* the cost for priority mail shipping to USA residents. A "Packet Radio Handbook" (hardcopy) is included with the CD ROM. To receive the CD ROM send check or MO ($20 US), payable to Buck Rogers, to: Buck Rogers, K4ABT, 211 Luenburg Drive, Evington, VA 24550. Be sure to include your return address. Sorry, **USA orders only**!

PicturePacket "Lite" is not a DEMO. It is a fully functional Windows™ 95, 98, or WinNT™ based packet radio terminal program. Whether you decide to register it or not, it will perform as a well-designed packet or other digital operating software package. Once your personal registration string is installed, the PicturePacket program will have all features activated.

To activate PicturePacket from the "Lite" version into the "Plus" version ($29.95), contact Stan Hunting, KW7KW, fax 303-444-2314, e-mail: <stan@sni.net>, on-line registration at: <http://www.sni.net/kawin/pages/picturepacket.htm>.

Be sure to visit our web site at: <http://www.packetradio.com>. For more information about PicturePacket, visit: <http://www.packetradio.com/picturepacket.htm> or <http://www.sni.net/kawin/ pages/picturepacket.htm>.

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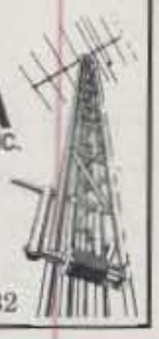

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1140 RG214/U dbl silver shld mil spec	1.85
1705 RG142B/U dbl silver shld, teflon ins	1.50
1450 RG174/U 50 ohm. 100" od mil spec	.14
1410 RG58/U mil type 50 ohm 95% shield	.12

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CIRCLE 70 ON READER SERVICE CARD

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The CQ 1999 Contest Survey—Technology in Contesting

March's Contest Tip of the Month

Speaking of technology, have you given any thought to giving your equipment a tune-up? Like a car, our station equipment needs preventative maintenance, too. Consider having a qualified technician (assuming that's not you!) run your transceiver(s) through its paces. Maybe you'll learn that that weak Asian station on 10 meters (you know, the one everyone else could hear) was really a problem with your receiver. No matter how proficient at operating you may be, you're only as good as your equipment.

It's that time of year again, time for another *CQ* Contest Survey. Every year around this time I attempt to stimulate debate and interest in contesting by surveying your thoughts on topics that are both controversial and timely. Hopefully, you'll find this year's edition no different.

You had to have been living in a cave to not realize the technological advances that have taken place in amateur radio over the past decade. There was a time, for example, when it was a major leap of faith for a group to gather the resources to put a PacketCluster node on the air—both financially and technically. Now there are over 1000 systems installed around the world with tens of thousands of active users. Equipment has advanced as well. Even if the average amateur has maintained his or her technical prowess of the past, I doubt many of us can service our own gear anymore on a regular basis. And, there's the personal computer. Once an adjunct feature in only a few shacks, the computer has become a mainstay device. Very few active amateurs don't have a PC installed as a prominent device in their portfolio of ham equipment (we'll find out more about that in our survey).

With this as a backdrop, let's go right to the survey. I encourage you to take a few minutes and voice your opinion. You'll find that in addition to being published in *CQ* magazine, I'll be making this survey available on most of the popular Internet e-mail reflectors. An electronic response is most welcome and can be sent directly to my address at <K1AR@contesting.com>. Of course, you can mail your replies in the conventional manner as well to: John Dorr, K1AR, 2 Mitchell Pond Road, Windham, NH 03087-1299.

2 Mitchell Pond Road, Windham, NH 03087
e-mail: K1AR@contesting.com

Calendar of Events

Feb. 26-28	**CQ WW 160 Meter SSB Contest**
Feb. 27-28	REF SSB Contest
Feb. 27-28	North Carolina QSO Party
Feb. 27-28	UBA CW DX Contest
Feb. 27-28	RSGB 7 MHz CW Contest
Mar. 6-7	ARRL Int'l DX SSB Contest
Mar. 9-10	CLARA Family HF Contest
Mar. 13-14	RSGB Commonwealth CW Contest
Mar. 13-15	QCWA QSO SSB Party
Mar. 14-15	Wisconsin QSO Party
Mar. 20-21	Bermuda Contest
Mar. 20-21	Russian DX Contest
Mar. 20-21	YL-ISSB QSO Party
Mar. 20-21	Ohio QSO Party
Mar. 20-21	Alaska QSO Party
Mar. 20-22	BARTG Spring RTTY Contest
Mar. 20-22	Virginia QSO Party
Mar. 27-28	**CQ WW WPX SSB Contest**
Apr. 3-4	EA RTTY Contest
Apr. 3-4	SP DX Contest
Apr. 9-11	Japan Int'l DX Contest (High Band)
Apr. 10-11	MARAC County Hunters
Apr. 17	European Spring Sprint Contest
Apr. 17-18	Holyland DX Contest
Apr. 17-19	Michigan QSO Party
Apr. 24-25	Helvetia Contest
Apr. 24-25	Florida QSO Party
May 29-30	**CQ WW WPX CW Contest**

Final Comments

Thanks in advance for taking the time to respond to this year's survey. Your answers (and comments) are invaluable in helping guide the future editorial direction of the "Contest Calendar." I encourage you to respond and pass along the survey to your friends and club members. Feel free to include it in your next club newsletter. It will only increase participation and make this a better survey!

As always, remember that the deadline for the June issue is April 1st. Please make sure you send your information to me on time (via e-mail is preferable)!

73, John, K1AR
Internet: <K1AR@contesting.com>

CLARA & Family HF Contest

1700Z Tues. to 1700Z Wed., Mar. 9–10

This is the 32nd anniversary of the CLARA Contest, and it is open to YLs and OMs around the world on phone and CW on all HF bands. Each station may be contacted twice per band mode.

Classes: Single operator, all bands.

Exchange: Name, RS(T), QTH (Canadian province/DXCC country), and whether CLARA member or Family member.

Scoring: CLARA-CLARA QSOs are worth 5 points; CLARA-YL QSOs are worth 3 points; CLARA-associate OM QSOs are worth 2 points; CLARA-OM QSOs are worth 1 point.

Multiplier: Canadian provinces and DXCC countries.

Final Score: Multiply total QSO points times multiplier.

Awards: Trophies and certificates will be awarded to high-scoring CLARA members, non-members, and OMs.

Send your entries no later than April 15th to: Audrey Hughes, VE1PK, 28 Carriageway Court, P.O. Box 134, Wolfville, NS, B0P 1X0 Canada.

Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., March 14–15

This popular party is a shorty, only 7 hours, and it is again sponsored by the West Allis Radio Amateur Club. The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

Classes: Single operator and multi-operator and transmitter, both fixed and mobile, Novice, Tech, both single and multi-operator.

Exchange: RS(T) and QTH. County for Wisconsin; state, province, or country for others.

Scoring: Phone QSOs count 1 point, 2 points for CW. Wisconsin stations multiply total QSO points by (U.S. states + VE provinces + Wisconsin counties) worked for their final score. DX contacts count for QSO points only. Others use total Wisconsin QSO points by the number of Wisconsin counties worked (maximum of 72).

Wisconsin mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 12 QSOs from each county). Mobiles may not sit on a county line and operate.

Frequencies: CW—3550, 3705, 7050, 7125, 14050, 21150. SSB—3890, 7230, 14290, 21350, 28400.

Awards: Awards will be sent to the highest scoring single operator in the contest and for each single operator class in each state and province. *Wisconsin:* The top 10 single operator scorers in each class will receive awards, as well as high-

Say You Saw It In CQ

est multi-operator in each class and highest aggregate club score (living within 50 miles of club center with the exception of mobiles). Logs with more than 200 QSOs must include a separate dupe sheet for each mode with their entry.

Complete rules and entry forms are available from the address below or at <www.execpc.com/WARAC>. Please be sure to include an SASE with your request by mail. Send your logs no later than March 31st to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201.

Bermuda Contest

0001Z Sat. to 2400Z Sun., Mar. 20–21

This is the 41st year for this popular contest open to all licensed amateurs. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands on SSB and CW. Cross-band or cross-mode contacts are not permitted.

You are limited to 24 hours out of the 48-hour contest period. Off times of no less than two consecutive hours must be clearly indicated on the log. Participation is for single operator stations only and previous winners are no longer restricted from official entries in the contest.

Exchange: RS(T) only.

Scoring: Five points for each QSO. A station may be worked on SSB and CW, but you may not take credit for an additional multiplier. Final score is the sum of QSO points times the number of countries on each band multiplied by the number of different VP9 stations worked on each band. (Note: It's each VP9 station, not each parish.)

Awards: Certificates will be awarded to the top-scoring station in each country (minimum of 100 QSOs, including at least three different 3 VP9s). The overall worldwide winner will receive a trophy, which will be mailed to the winner unless he or she chooses to collect it in person at the annual banquet in October, in which case transportation to Bermuda will be provided by the Bermuda Dept. of Tourism and accommodation will be provided by the Palmetto Bay Hotel.

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be *received* no later than June 1st by the Radio Society of Bermuda, Box HM275, Hamilton HM AX, Bermuda. Enclose 4 IRCs for acknowledgments.

Alaska QSO Party

0000Z Sat. to 1200Z Sun., March 20–21

The Alaska QSO Party is sponsored each year by the South Central Amateur Radio Club, Anchorage, Alaska, and is a great opportunity to work this very rare state. Stations may work Alaska stations only (Alaska stations work everyone).

Exchange: Send RS(T) and state/province/DXCC country (Alaska stations send their city).

Scoring: Credit 1 point per phone and 2 points per CW, digital, or SSTV QSO. One-sixty meter, 80 meter, satellite QSOs count for double credit. Final score is QSO points times Alaska cities worked (Alaska stations use states/provinces/DXCC countries).

Suggested Frequencies: 1.835 MHz; 3.700, 3.875 MHz; 7.035, 7.135, 7.235 MHz; 14.035, 14.245 MHz; 21.135, 21,335 MHz; and 28.135, 28.335 MHz

Send logs by June 30, 1999 to: South Central Amateur Radio Club, c/o Jim Wiley, KL7CC, 8023 E. 11th Court, Anchorage, AK 99504. Visit the club's Web site at: <www.servcom.com/worcester/scrc.htm> for more information.

Russian DX Contest

1200Z Sat. to 1200Z Sun., Mar. 20–21

Sponsored by the Contest Committee of the SRR, this one is open to all amateurs worldwide on 160–10 meters (no WARC bands). Operation can take place on SSB and CW. The same station may be worked on other bands or even on same band (but in this case with two restrictions— use another mode and do it no earlier than in 10 minutes after the previous QSO).

Classes: Single Op., All Bands (separately mixed mode, CW, SSB); Single Op., Single Band (mixed mode, CW, SSB) on

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CIRCLE 59 ON READER SERVICE CARD

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CIRCLE 36 ON READER SERVICE CARD

160, 80, 40, 20, 15, 10 meters; Multi-Op., All Bands, Single Transmitter; SWL (mixed mode). Note that the common 10-minute rule applies to multi-single entries.

Exchange: RS(T) + QSO number starting with 001; Russian stations—RS(T) + two letters (oblast designator).

Scoring: QSOs within own DXCC country 2 points; another country on same continent 3 points; other continents 5 points. Contacts with Russian stations 10 points for all participants. Multipliers are DXCC countries and each Russian oblast per band. Final score is total sum of QSO points from all bands multiplied by sum of multiplier points from all bands.

Awards: Winners of single and multi-op (all band only) categories (separately Mixed, SSB, CW) will be awarded plaques. Winners of other categories and runners-up will be awarded certificates. Stations with 200 or more QSOs will receive certificates of merit.

Send all entries to: Contest Committee of SRR, P.O. Box 59, 105122, Moscow, Russia. Logs can also be submitted by e-mail using .DAT or .BIN formats plus .SUM files to: <ra3auu@contesting.com>.

Virginia QSO Party

1800Z Sat. to 0500Z Sun., Mar. 20–21
1100Z Sun. to 0200Z Mon., Mar. 21–22

This is the 24th year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO multiplier credit as well as VA mobiles operating from different counties.

Classes: Single Op., Multi-Single, Mobile, Club, Multi-Multi Transmitter.

Exchange: QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

Scoring: Credit 1 point for each SSB contact; 2 points for CW; 3 points for working a VA mobile. VA stations multiply total QSO points by sum of US states, VE provinces, DX countries, and VA counties. Others multiply total VA QSO points by the number of VA counties worked (maximum of 95). Mobiles add to this the bonus points for Virginia counties in which QSOs were logged.

Frequencies: CW—1805 kHz and 50 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—1845, 3860, 7260, 14260, 21360, and 28360. Also Novice bands (10 kHz up from bottom of Novice sub-band and 28360).

Awards: Certificates to top scorers in each state, province, DX country, and VA county. There are a variety of plaques available to category winners, too.

Logs: Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 18th to: Virginia QSO Party, Call Box 599, Sterling, VA 20167.

CQ World-Wide WPX Contest

SSB: March 27–28 CW: May 29–30
0000Z Sat. to 2400Z Sun.

Complete rules were published in the February issue of *CQ* magazine. A new scoring point is the following: **Contacts between stations in the same country are worth one (1) point regardless of band.** This is new for the 1999 contest.

The following are a few other points to keep in mind. You may operate 36 hours out of the 48-hour contest period as a single operator station. Off-times must be a minimum of 60 minutes in length. Multi-op stations can operate the full 48 hours.

The definition of the prefix multiplier is spelled out in detail, but consider a prefix to be the letter/number combination which forms the first part of a call.

The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the Multi-Operator, Single Transmitter category, only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same time period is prohibited. Speaking of categories, you may want to take note of the Tribander, Rookie, and Band Restricted entry classes.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log. Note that contest logs on disk are encouraged (MS-DOS compatible). CT's *.BIN file or *.ALL file, N6TR's *.DAT file, NA's *QDF file are preferred. An ASCII file containing all required information is also acceptable. To reduce the administrative burden, please label your computer entries with a unique name (e.g., N8BJQ.BIN). Disks or electronic files are required from all top-scoring stations and those which use a computer to prepare the logs.

Logs may be submitted via e-mail to <n8bjq@erinet.com>. Internet submissions will also require a summary sheet and prefix multiplier sheet. Logs received via e-mail will be confirmed via e-mail upon receipt.

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. **Be sure to indicate SSB or CW on the envelope.**

All logs go to: CQ WPX Contest, 25 Newbridge Rd., Hicksville, NY 11801.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 7354 Thackery Road, Springfield OH 45502 U.S.A. or via <n8bjq@erinet.com>. ■

1999 CQ Magazine Contest Survey—Technology in Contesting

Your Callsign (optional): _____
Contesting Experience (years): _____
Age: _____

1. Do you believe that contesters who possess advanced technical expertise have a competitive advantage over those who lack this experience?
   ☐ YES ☐ NO

2. Do you have a dedicated personal computer in your ham shack?
   ☐ YES ☐ NO

3. If yes to #2, please answer the following:
   What year did you install your first PC in your shack? _____
   What size processor? _____
   Internet accessible? ☐ YES ☐ NO
   What primary applications do you use? _____
   _____

4. Do you have access to PacketCluster in your shack for DX spotting?
   ☐ YES ☐ NO

5. In general terms, do you feel that technology has overtaken the sport of "operating" so that stations with the most gadgets enjoy a significant competitive advantage?
   ☐ YES ☐ NO

6. Do you feel that you have the technical expertise to maintain your own equipment (excluding simple problems)?
   ☐ YES ☐ NO

7. Should multi-operator stations be allowed to use the Internet to access other spotting nodes outside of their local area (i.e., via TELNET access)?
   ☐ YES ☐ NO

8. What one or two technological advances do you see emerging in contesting that don't exist today (or at least are still not widely adopted)?
   _____
   _____

9. Do you feel that contesters are leaders in technological advancement within our hobby?
   ☐ YES ☐ NO

10. Rate the importance (1 to 6) of the following technologies in your shack from a contest perspective.
    Computerized contest logging _____
    DX Spotting _____
    Automatic band/antenna switching _____
    External digital signal processing/bandpass filtering _____
    Automatic amplifier tuning on band changes _____
    Other: _____ Rating: _____

11. In general, do contest rules adequately address the use (or potential abuse) of technology in contest operating?
    ☐ YES ☐ NO

Additional Comments: _____
_____
_____
(use extra sheets if necessary)

Return your survey responses to:
John Dorr, K1AR, 1999 Contest Survey, 2 Mitchell Pond Road, Windham, NH 03087 USA or: <K1AR@contesting.com>.
Deadline: June 1, 1999

BY TED MELINOSKY, K1BV

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

Back in October of last year Don, W3EYF, completed the last county for USA-CA. At that point he was just waiting for that last QSL. Here is his background, in his own words.

The Bible tells us that the Israelites wandered about in the desert before reaching the Promised Land, Canaan. In retrospect, I can see how I also wandered about for 40 years before working U.S. county #3076 for *CQ*'s worked all U.S. counties award.

Forty years ago I was a dedicated DX and award chaser. At the time, I did complete the necessary requirements to receive Britain's WABC (Worked All British Counties) award. It just did not occur to me to work all U.S. counties, and I certainly didn't know how many there were.

During the 1960s I entered all sorts of contests and QSO parties, many of which required counties. Many of the awards offered by foreign amateur radio associations required either the equivalent or countries. My most coveted award was *CQ*'s WAZ, which I received in 1964. However, I also received awards for worked all Maine, Vermont, New Hampshire, Connecticut, New Jersey, Delaware, and also Pennsylvania. In addition, I received certificates for win, place, or show and participation in their QSO parties, as well as West Virginia, Virginia, Maryland, Tennessee, and California! All of these used counties as a requirement and so In was piling up a lot of counties.

Finally in the latter 1960s I began to operate portable from counties to provide the then growing army of county hunters! In fact, I even had QSL cards printed for each operation, but I still did not consider myself a county hunter.

I became an Extra class operator in the 1970s, bought a secondary location on Chincoteague Island, Virginia, Accommack county, and operated there with a secondary license as WB4OZG, but operated mobile back and forth to Baltimore, Maryland as W3EYF/M and continued to give out counties to the county hunters. Of course, I was pursuing my main interest, awards and DX.

In the late 1970s and 80s I made the DXCC Honor Roll, 5BWAS, 5BDXCC, and the Geritol Award. Also during that time one of our daughters moved to Christiansburg, Virginia, and another moved to Orange county, Virginia. Naturally, I took many diverse routes in our visits to them and what might have been a much shorter trip was lengthened by my numerous excursions along the way, operating mobile on the CHN.

Finally, in 1984, I was encouraged to become a county hunter by Mike Mutnick, KV0E. My first impulse was to gather all my QSLs and start keeping records and of all things neglect DX!

In the 1980s one of our daughters moved to Florida and one to Washington state—more, longer trips and counties to give out along the way! In 1987, though, things came to a halt for a while, as I had a heart attack. I am still chasing DX, counties, and awards, but I don't operate mobile, although I plan to put a rig in another car and do some limited mobile again. After USA-CA, I plan to do it all again, all mobile, all CW, and maybe all SSB.

My last county for the USA-CA award was K1ER/M on both SSB and CW on 15 meters in Kalawao, Hawaii, and it certainly was the most difficult for me. My thanks to John Peters, K1ER, and to KJ5C for a relay for the SSB contact.

I still remember years ago on a dead band hearing a Japanese operator call me while mobile to get some counties he needed for USA-CA! Operating mobile is a real thrill!

As much as I was indifferent to USA-CA, I now regard it as one of my major achievements. The county hunters are a good bunch of people and demonstrate the fraternal aspect of ham radio. They are helpful, and I never would have made it by myself. —73, Don, W3EYF

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net

USA-CA Special Honor Roll

John Scott, WM9U
USA-CA All Counties #963
December 2 1998

Carl Johnson, W3DR
USA-CA All Counties #964
December 7, 1998

Bruce S. Gibson, WA3GNW
USA-CA All Counties #965
December 15, 1998

Seacoast Wireless (Club Station) W1BQL
All Counties #966
December 19, 1998

Robert T. Devine, KC6AWX
All Counties #967
December 24, 1998

USA-CA Honor Roll

500

KF4HZH	3051
CT1EEN	3052
UA9OA	3053
W3DR	3054
WB4JJJ	3055
W1BQL	3056
KC6AWX	3057

1000

WM9U	1498
W3DR	1499
W1BQL	1500
KC6AWX	1501

1500

WM9U	1246
W3DR	1247
W1BQL	1248
KC6AWX	1249

2000

WM9U	1143
W3DR	1144
DJ4GJ	1145
W1BQL	1146
WA5VGI	1147
KC6AWX	1148
KD9ZP	1149
K1BV	1150

2500

WM9U	1069
W3DR	1070
W1BQL	1071
KC6AWX	1072

3000

WM9U	980
W3DR	981
WA3GNW	982
W1BQL	983
KC6AWX	984

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated March 1, 1997. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

USA-CA Award News

It's been an exciting month for all USA-CA award achievers, with five making it to the list of county completers. Even more important, the tempo of endorsement activity for those a little farther down the chain has increased as well. I continue to encourage applying for the award as soon as you can possibly qualify, and adding the seals and ribbons I mail for your continued achievement. USA-CA is a large, colorful, and magnificent certificate. It's well worth framing, even if you have to take it down to add those seals!

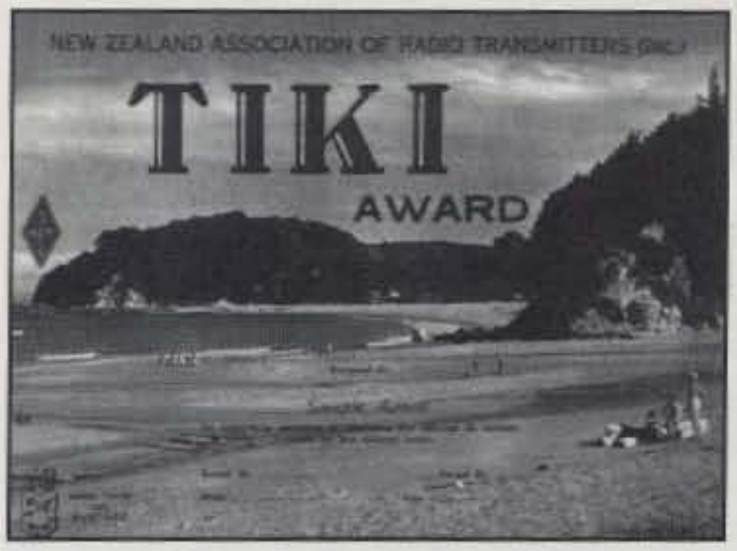
NZART Awards Available

This is the third and last part of the series on the handsome awards offered by the New Zealand Association of Radio Transmitters (NZART).

General Requirements: Applicants do not have to possess the cards, but must certify that the contacts were legitimately made. Contacts must have been made after 1 Nov 1945 except where specified. When lists are needed to submit for the award, these may be obtained from the sponsor or from K1BV for an SASE or IRC, whichever is appropriate. Special endorsements are available for single band

Say You Saw It In CQ

or mode accomplishments. Costs for all awards for DX applicants is $US2, except WAP and 5X5, which are $US3. For overseas airmail, add $US1. The fee for New Zealand applicants is $NZ1 unless otherwise specified. Send all applications to: NZART Awards Manager, Alan Chapman ZL3GX, P.O. Box 1733, Christchurch 8015, New Zealand.



The Tiki award is offered by the NZART for working five different ZLs each on five different bands.

Tiki Award. The first, the Tiki Award features "Fun in the Sun," a full-color photograph of one of New Zealand's many sheltered beaches. Working the five stations on most bands seems to be pretty easy, but the real challenge, for many countries of the world, is working them on 80 meters.

Work five different ZL's, each on five different bands, for a total of 25 cards. Cost is $2.

Guiding Light Award. Information on the Guiding Light award arrived just as this column was being written. No sample is available at this time. It is a new addition to the NZART series and requires the working of NZ stations within a specified radius of a number of the lighthouses of New Zealand. The award requires the use of a special application and even comes with a map displaying the location of these lighthouses on North and South Islands. The initial date for the contacts is November 1, 1998, so you can't go rummaging through all your QSLs for qualifiers.

Contact NZ stations operating within 30 km (or 10 km in some cases) of the location of prominent NZ lighthouses per an official listing available from NZART or K1BV for SASE. You will need to earn 20 points for the "Mariners" level and 50 points for the "Master Mariners" level. A NZ station operating within the required radius may claim that lighthouse for credit. SWL okay. Costs: $NZ5, $A5, $US5, or 5 IRCs.

Lakeside Award (NZLA). The Lakeside award is another one for which a special application and listing of eligible lakes is necessary. It is a small, 6 × 8 inch full-color award featuring Mt. Earnslaw and a lake steamer. Since it's one of the older awards, you are allowed contacts going

The Lakeside award is given for contacting stations operating on the shores of ten freshwater lakes in New Zealand.

back to 1976, so it's possible that you may already have one or two of the needed "lake" contacts.

Contact stations operating on the shores of 10 freshwater lakes in New Zealand. Endorsements for each additional 10 up to 40 lakes. Honor award for 50 lakes with further endorsement each added 10. Stations must be located within one kilometer of the water or in a town on the lake shore. Official check sheets required; cost is 20 cents plus large SASE. Contacts after 1-5-76. SASE for any endorsement.

Individual ZL District Awards. Each of the following four awards is what I call a "quantity" award. The sole criteria is contacting numbers of particular prefixed ZL stations, the numbers varying roughly as to the relative scarcity of each prefix. Many award hunters have a tactic for working on these awards, and that tactic is called contesting, where large quantities of contacts may be made with specific or all countries in a short amount of time. The VK/ZL Contest, CQ WW DX, and ARRL DX contests all offer opportunities to add to your ZL totals. Other countries using this approach include the Czech Republic and The Netherlands.

All contacts must be postwar. Endorsements are 1 IRC each. May be endorsed for band or mode or any annual period. ZL or ZM prefixes okay.

ZL1 Award. Contact 125 different ZL1 stations. Endorsements at 175 and 250.

ZL2 Award. Contact 100 different ZL2 stations. Endorsements at 150 and 200.

ZL3 Award. Contact 50 different ZL3 stations. Endorsements at 75 and 100.

ZL4 Award. Contact 25 different ZL4 stations. Endorsements at 35 and 50.

NZART's ZL1 award is given for contacting 125 different ZL1 stations.

The Pyramids Merit Award

Well-known DXer and QSL manager WA3HUP is administering the Pyramids Merit Award newly offered by the Egyptian Radio Amateurs Assembly. The award is beautifully printed on heavy card stock in full color featuring scenes from the glorious history of Egypt. This may be a difficult award to earn, as it requires working Egyptian natives, and does not count portable operations. There doesn't seem to be a date limitation, so check out your QSL collection for any old SU contacts which may get you off to a good start. Following my own good advice, I can report that all I need is four more plus SUØERA.

The Pyramids Merit award, sponsored by the Egyptian Radio Amateurs Assembly, is given for contacting any five SU stations plus one contact with club station SUØERA.

Contact any five SU stations plus one contact with club station SUØERA. Must be Egyptian citizens with SU prefix; no portable stations in Egypt valid for award. All bands and modes. Send Xerox copies of the cards and fee of $US5 to: Mary Ann Crider, WA3HUP, 2485 Lewisberry Road, York Haven, PA 17370.

Internet Site of the Month

EA5OL's site provides complete lists for Spanish islands, lighthouses, and castles. This is a valuable source of information for three of the Spanish awards needing extensive geographical research not ordinarily available without great difficulty. Visit <http://www.arrakis.es/~ea5ol>. This is his home page, and even though in Spanish, there are easily followed links to the lists. This is a perfect use of the Internet to store and provide some very odd and specific data of interest only to diehards like us. And if your web browser is set up for it, you will be entertained by some very good soundtracks from popular TV shows.

I continue to look for your sample award and rules so I can give you free publicity.

73, Ted, K1BV

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

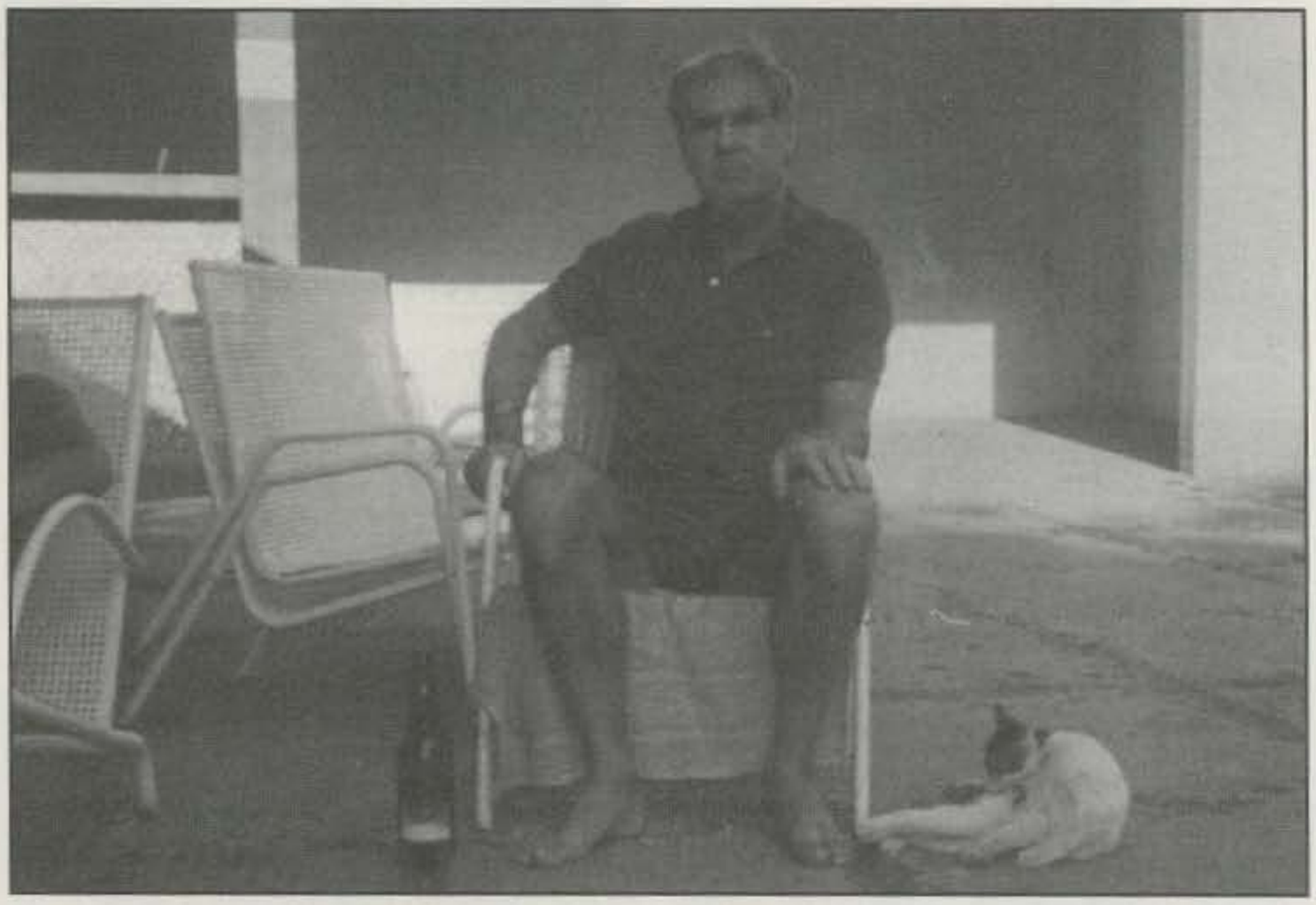
DXpedition Season

Sunspot Cycle 23 is progressing as promised. Solar flux levels have risen enough to open high-latitude paths on the higher bands. Out on the West Coast, for example, we look for good 10 meter openings to Europe as a sign of excellent band conditions. East Coast DXers look for a similar opening to Japan and Southeast Asia. When 10 meters is open on near-polar paths, DXing is good. And when DXing is good, DXers go on DXpeditions.

March is an especially good month for DXpeditions, thanks in part to two major SSB contests: the ARRL SSB DX Contest at the beginning of the month and the CQ WPX SSB Contest at the end. Many individuals and groups will head out to places otherwise relatively rare on the amateur bands. These operators will assemble a substantial station for all bands and be active throughout the contest period. Most operators will also be available on other modes and on the new bands outside the contest period. These contest DXpeditions provide excellent opportunities for the knowledgeable DXer to pick up new band-countries, and maybe some all-time New Ones.

As an example, take the Woodbridge Wireless group from Virginia. They are headed to San Andres Island HKØ March 2–9, including a multi-op entry in the ARRL SSB DX test March 6–7. San Andres is a small island in the Caribbean Sea off the coast of Nicaragua, but belongs to Colombia. It is popular both as a vacation spot and a duty-free port.

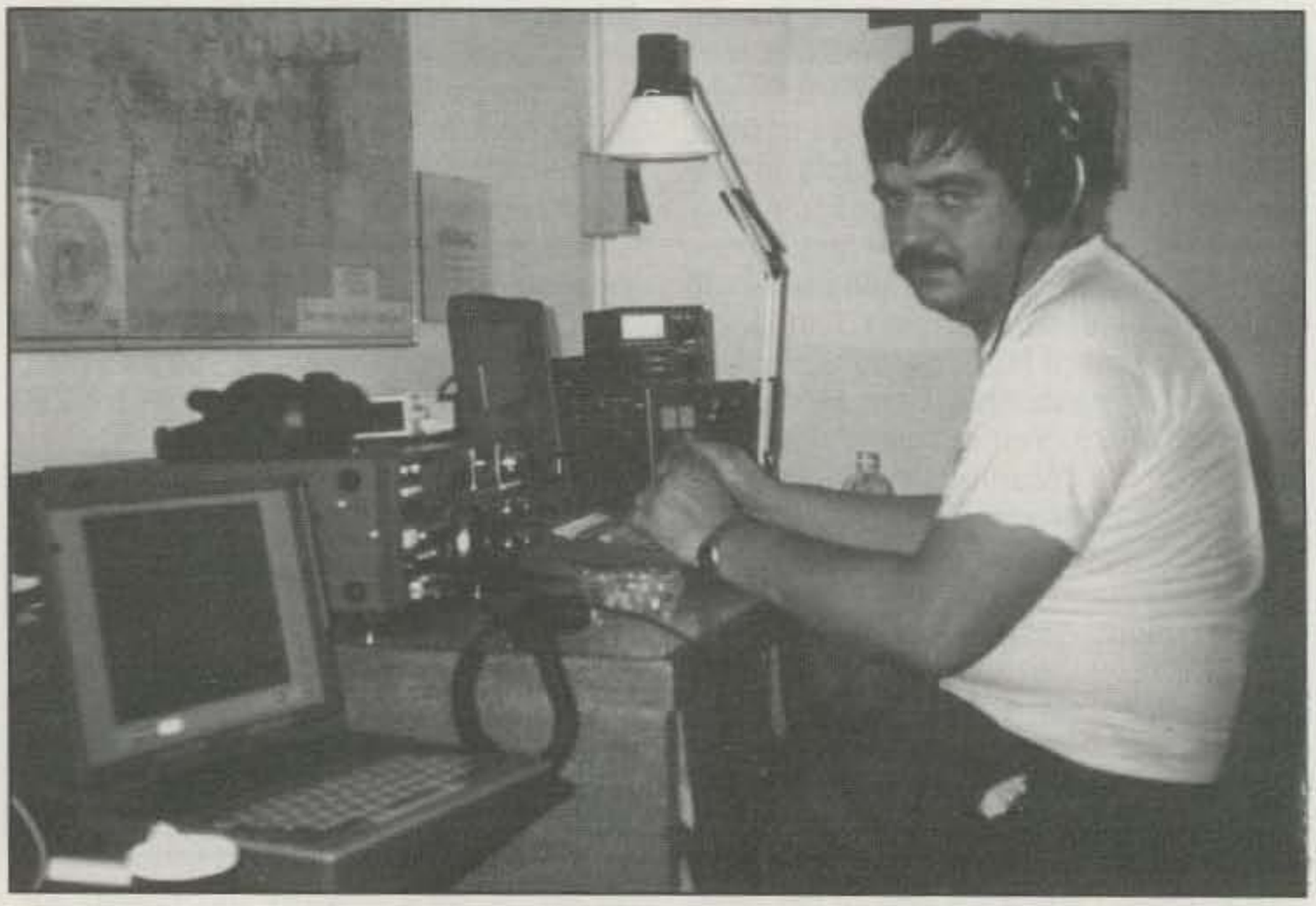
Operators include Dennis, W4DC; Ed, K5OF; Jack, AA3KX; CQ DX Hall of Famer Carl Hansen, WB4ZNH, and his wife Martha, WN4FVU; Vic, N2PP; and Everett, WZ8P. In addition to the contest effort, they plan RTTY and CW operation outside the test, as well as activity on 30, 17, and 12 meters. No callsign has been issued; however, the QSL route is via W4DC. They plan to automatically QSL all contest contacts with a photo QSL via the bureau. To QSL contacts outside the contest or for a faster, direct QSL, go via W4DC. More information about the operation is available from Dennis, W4DC, at <catalanode@navsea.navy.mil>. During the operation, Mike, KA4RRU, at <ka4rru @erols.com> will be in touch with the operators on San Andres. A home page with log checking and other information is available at <http://www.pwcweb.com/wwi/DXpedition>.



Baldur Drobnica, DJ6SI, operated as TZ6SI from Mali.

DXers looking for contacts with San Andres should keep a few points in mind. First, the best time to work the DXpedition on SSB will be during the contest weekend. Especially on Sunday, the contest operators will be actively seeking stateside contacts, without competition from other parts of the world. As San Andres lies south of the U.S. and is surrounded by water, you should expect good signals on all bands.

A couple of precautions for those intending to work the contest DXpeditions: DXers who are not contesters should take



I2VXJ operating from the Vatican as HV4NAC.

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The WPX Program

SSB

2693.....JA0CJK

CW

3000 .....DL1AMA 3002.....NT5O
3001 .....UT5FA

Mixed

1822.....IK8GGT 1824 .....VE9FX
1823 .....WB2AQC 1825 .....DL3ZAI

CW: DL1AMA, UT5FA, NT5O. 400 DL1AMA, UT5FA, NT5O. 450 DL1AMA, UT5FA, NT5O. 500 DL1AMA, UT5FA. 550 DL1AMA, UT5FA. 600 UT5FA. 650 UT5FA, AA1KS. 700 UT5FA, AA1KS. 750 UT5FA. 800 UT5FA. 850 F5YJ. 1150 LA3GI. 1900 I7PXV. 3850 N6JV. 4200 WA2HZR.

SSB: 350 S51U. 400 S51U. 450 S51U, BD4DW. 500 S51U, BD4DW. 550 S51U. BD4DW. 600 S51U, BD4DW. 800 KJ5LJ. 850 KJ5LJ. 1350 LU5DV. 1400 LU5DV. 2050 K5RPC.

Mixed: 450 IK8GGT, WB2AQC, DL3ZAI. 500 WB2AQC. 550 WB2AQC. 600 WB2AQC. 650 WB2AQC. 700 WB2AQC. 750 WB2AQC. 800 WB2AQC, W2FKF. 850 WB2AQC. 900 WB2AQC. 950 WB2AQC. 1000 WB2AQC. 1050 WB2AQC. 1100 WB2AQC. 1150 WB2AQC. 1200 WB2AQC. 1250 WB2AQC. 130 WB2AQC. 1350..WB2AQC. 1400..WB2AQC. 1450..WB2AQC. 1500 WB2AQC. 1950 I2EAY. 3650 SM3EVR. 4150 ZL3NS.

10 meters: S51U, I2EAY
20 meters: I2EAY
80 meters: S51U, I2EAY
160 meters: NT5O

Africa: S51U, W9IAL, I2EAY
N. America: S51U, NT50
S. America: S51U, I2EAY
Oceania: S51U, K2YJL

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, DK4SY, UR2QD, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DE0DAQ, IQWXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP. OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, N5UR, VE3XN, DL3RK, OKMP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BU, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA.

a few minutes to learn the rules of the contest. The contest DXpeditioners expect stations calling to provide a correct contest exchange and *nothing else*. They don't want to know your name or weather; just the contest exchange.

For the two SSB contests this month, the exchange for stateside stations is very simple. In the ARRL SSB DX Contest, stateside callers send a signal report and state. (The DX station will send a signal report and power level.) In the CQ WPX

Glenn, W0GJ, on Heard Island as part of the VK0IR DXpedition. (KK6EK photo.)

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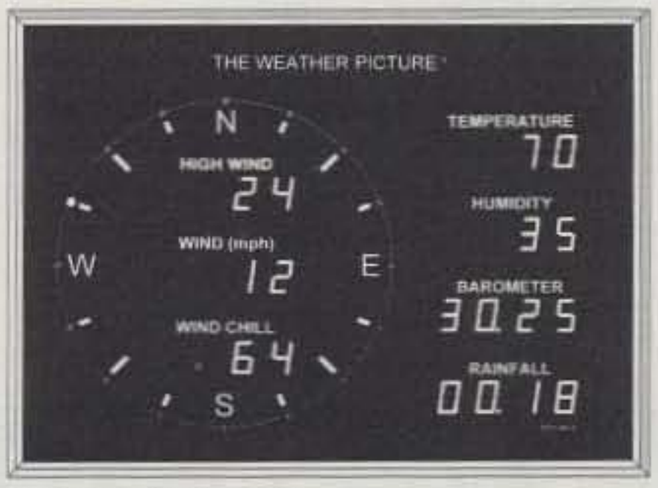

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Mali amateurs gather with officials from SOTELMA, the amateur licensing authority. From left: Bob, TZ6DX; Alexandre, TZ6AK; Trish, TZ6YL; Larry, TZ6VV; Madame Fatoumata Maiga; Diadie, TZ6RC (president); Aline, TZ6AB; Monsieur Zourcoufi Maiga; Yatt, TZ6HY; Holger, TZ6TT (host); and Monsieur Mahamadou Keita. Thanks to TZ6JA for the photo.

SSB Contest, the exchange is signal report and consecutive serial number.

Further, a contest contact is very short. Stateside callers should send their callsign *once*, and once only, and wait for a response. Most contest contacts are simplex—that is, using the same frequency for transmitting and receiving. This makes it especially important that the calling station match the rhythm of the DX contester. Calling while the DX station is transmitting will blot out a QSO in progress. The terrible operating technique of calling and calling until the DX station works you is even more obnoxious in contests that on split-frequency DXpeditions.

Obviously, DXers seeking contacts on other bands or modes should look for QSOs outside the contest. However, DXers shouldn't wait until *after* the contest for such contacts. The contesters tend to be tired after the contest, and they still face the tasks of dismantling the station and packing for the trip back to the States. Before the contest, the operators will be testing equipment and antennas, and should be readily available for non-contest QSOs.

Note that San Andres HKØ is a different DXCC entity from the very rare Malpelo HKØ. Malpelo is a small rock some 500 miles south of San Andres, in the Pacific. Access to Malpelo is closely controlled by the Colombian military, and operations from the rock are always under the direction of the Colombian IARU society. A Malpelo operation is in the works within the next year or so.

Whichever of the HKØ stations that you work, you should practice "safe DXing" to ensure that you can obtain a confirmation of your contact. Steve Wheatley, KU9C, QSL manager for the recent **BQ9P** Pratas Island operation, points out a new problem for DXers: their callsign is in the BQ9P log on the web, but the DXer doesn't have any QSL details for the QSL card. This can happen when a DXer can't hear the DX station acknowledge the contact, perhaps due to the DX policemen and the like. The DXer doesn't log the contact due to the lack of a clear acknowledgment. The DXer then checks the log on the web and finds his or her callsign. However, without at least *some* QSO information, no reputable manager will provide a QSL card.

Another possibility is the unfortunate DXer whose computer hard disk crashes before a timely backup, and the QSO information is lost. In both of these cases, the DXer's callsign is "in the log," but unconfirmable without additional QSO data.

Steve makes several excellent suggestions for avoiding this problem. The first is to practice "safe computing." As any long-term computer user will testify, there are two kinds of hard drives: those which have crashed and those which will crash in the future. DXers should *always* expect their hard drive to crash at the worst possible time and maintain suitable backups. I recommend an off-site storage location for the backups.

However, this solution doesn't solve the problem of not logging the QSO in the first place. When chasing rare DX, Steve recommends a paper back-up log, retained until the important QSO is confirmed. I second this notion, and practice it in my shack. While all routine DX contacts are simply entered in the computer log, I keep a separate, parallel paper log for mean-

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more active countries. The ARRL DXCC Countries List is used as the country standard. Currently, there are 330 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and are removed from all totals as they occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE for confirmation of total. The fee for endorsement stickers is $1 each. Please make all checks payable to the awards manager, B.F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, Florida 32208 USA.

CW

K2TQC 330	KZ4V 329	F3AT 327	4N7ZZ 326	K8LJG 324	HA5DA 321	AA2X 314	VE9RJ 309	YV5ANT 299
K2FL 330	WØHZ 329	PAØXPQ 327	DJ2PJ 326	K4CN 324	IT9ZGY 320	WB4UBD 313	9A2AJ 309	KØHQW 299
K6JG 330	F3TH 328	W6DN 327	WB5MTV 326	DL3DXX 324	K2JF 319	N1HN 313	HB9DDZ 307	G4MVA 294
K2OWE 330	DL8CM 327	I1JQJ 327	9A2AA 325	IT9QDS 323	HA5NK 319	K9DDO 312	I2EOW 307	W4UW 294
N4JF 330	WØIZ 327	W7CNL 327	OK1MP 325	N5FG 323	N6AV 318	K4JLD 312	CT1YH 305	KB8O 292
K9BWQ 330	G4BWP 327	I4LCK 327	W4LI 325	W4OEL 323	K6CU 318	W3II 312	W7IIT 305	F6HMJ 292
K1MEM 330	I4EAT 327	N7FU 326	K9IW 325	W6SR 323	VE7DX 318	YU1AB 312	KE5PO 304	LU3DSI 292
K2ENT 330	SM6CST 327	IT9TQH 326	I5XIM 325	VE7CNE 323	G3KMQ 317	K1VHS 311	G2FFO 303	DJ1YH 288
K6LEB 330	W2UE 327	K4CEB 326	WA8DXA 325	KUØS 322	N4CH 317	WA8YTM 311	IKØADY 302	YU7FW 286
K3UA 329	W2FXA 327	WA4IUM 326	N5FW 325	K5UO 322	LA7JO 316	N6AW 311	K1FK 302	EA3BHK 282
N4MM 329	K4KG 327	K4IQJ 326	IK2ILH 325	KA7T 322	N5HB 316	K7JS 311	W6YQ 301	YC2OK 280
EA2IA 329	K8PV 327	NC9T 326	N6AR 324	KA5TQF 321	NØFW 315	OH3NM 310	N4OT 301	PY4WS 276
K2JLA 329	W4QB 327	N7RO 326	IT9VDQ 324	ON4QX 321	K8JJC 315	OZ5UR 310	KH6CF 300	KF8UN 276
W7OM 329	K9MM 327	W1WAI 326	W8XD 324	K9QVB 321	N4AH 315			

SSB

K4MZU 330	W6BCQ 327	WØYDB 326	WA4WTG 325	YV5CWO 323	G4ADD 320	KV2S 315	W3YEY 306	OE7KWT 290
K2TQC 330	K5OVC 327	W4QB 326	WD8PUG 325	I8KCI 323	I4WZK 320	WA9RCQ 315	XE1MDX 305	N6CFQ 290
K2FL 330	KZ2P 327	WB4UBD 326	W2CC 325	VE4AT 323	I4SAT 320	N3ARK 315	DK5WQ 305	WZ3E 290
EA2IA 330	VE7DX 327	W2FXA 326	PT2TF 325	KD5ZM 323	EA3EQT 320	K6BZ 315	EA5OL 305	WG7A 290
W6EUF 330	AA6BB 327	N4KG 326	KM2P 325	KA5TTC 323	KØFP 320	K7TCL 315	WB2AQC 305	IK2PZG 289
K2JLA 330	EA4DO 327	K8PV 326	N5FW 325	KB2MY 323	KE3A 320	I4CSP 315	K6CF 304	VK3IR 289
K6JG 330	ZL3NS 327	NC9T 326	K9HDZ 325	EA3BKI 323	N4CSF 320	W2FKF 315	KC4FW 304	KF7VC 288
K6GJ 330	SM6CST 327	N4CH 326	WA3HUP 325	K8YVI 322	NI5D 320	NØAMI 314	WB2NQT 303	OK1AWZ 287
N4MM 330	W3GG 327	K5UO 326	YV1CLM 325	K9HQM 322	N4HK 320	WB8ZRV 314	EA3CWK 303	IK2DUW 287
N4JF 330	I4EAT 327	W6SR 326	N6AW 325	KC5P 322	DL3DXX 320	OH5KL 313	EA3BT 303	EA5GMB 287
VE1YX 330	W4UNP 327	W4LI 326	ZP5JCY 325	WW1N 322	ON5KL 319	WDØDMN 313	YC2OK 303	TU2QW 286
K5TVC 330	F9RM 327	WDØBNC 326	WB3DNA 325	W6SHY 322	WA4DAN 319	K9YY 313	KD4YT 302	NM5O 285
K6YRA 330	OZ3SK 327	W9SS 325	I2EOW 325	W2JZK 322	KI3L 319	W9IL 313	CT1YH 302	EA1AYN 285
YU1AB 330	4Z4DX 327	WA4IUM 325	KE5PO 325	CE7ZK 322	XE1MD 319	W1LQQ 313	N5QDE 302	VE7HAM 285
PY4OY 330	CX4HS 327	XE1AE 325	K4JLD 325	LU7HJM 322	KB1JU 319	KD5ZD 312	RA2YA 301	IK2HBX 284
XE1L 330	OE3WWB 327	KA3HXO 325	K1HDO 325	K5NP 322	PY2DBU 319	N5HB 312	W2LZX 301	KE6CF 283
W7OM 330	K7JS 327	KF7SH 325	YV5IVB 325	KB8O 322	IØSGF 319	IN3ANE 311	N3RX 301	KK4TR 283
K4MQG 330	DU9RG 327	YV5AIP 325	KD8IW 325	YV1JV 322	KF8UN 319	F1OZF 311	YT7TY 300	K7HG 283
I4LCK 330	W6DN 327	K9IW 325	W8KS 325	VE4ROY 321	KG6LF 319	EI6FR 311	W5OXA 300	YC3OSE 282
VE3MR 330	IT9TQH 327	WA4JTI 325	N2VW 325	XE1CI 321	F6BFI 319	YZ7AA 311	K3LC 300	WN6J 281
K7LAY 330	IT9TGO 327	YV1AJ 325	VE2GHZ 325	LZ1HA 321	N6RJY 319	AE5DX 311	WB6GFJ 299	CP2DL 281
W7BOK 330	WD8MGQ 327	YV1KZ 325	N6AR 324	WA5HWB 321	K9QVB 318	GM4XLU 311	YV4VN 299	YU1TR 280
4N7ZZ 330	I1EEW 327	W9OKL 325	W4UW 324	TI2JJP 321	AA4AH 318	KA5RNH 310	SV1RK 299	KN4RI 280
K3UA 329	IØZV 327	9A2AA 325	VE2PJ 324	W8AXI 321	KF5AR 318	I2MQP 310	LU3HBO 299	WD9ACQ 280
K1UO 329	ZL1AGO 327	DL6KG 325	I8LEL 324	W5XQ 320	I8IYW 318	HA6NF 310	KJ9N 298	OA4EI 280
W7FP 329	SV1ADG 327	OK1MP 325	IT9ZGY 324	KA5TQF 320	WA8YTM 318	KF7RU 310	KB5WQ 295	WØIKD 279
K9BWQ 329	VE3XN 327	WB3CQN 325	K6LEB 324	TI2HP 320	KX5V 318	AB4IQ 310	YT1AT 294	EA3CWT 278
IK1GPG 328	K9MM 327	I2QMU 325	IK1GPG 324	KS2I 320	CE1YI 318	W4WX 310	IT9VDQ 293	LU5EWO 278
LA7JO 328	DL8CM 327	KB4HU 325	VE7WJ 324	W7ULC 320	K4JDJ 318	EA5RJ 309	KJ5LJ 293	VE2DRN 277
DL9OH 328	NØFW 327	KC4MJ 325	AI8S 324	W3AZD 320	WA6DTG 317	CT1EEN 309	TI2LTA 292	9A9R 277
VK4LC 328	I8KCI 327	CX2CB 325	N5FG 324	WØULU 320	ZL1BOQ 317	EA5KY 308	KQ4WD 292	K3LC 277
OE2EGL 328	XE1VIC 327	TI2CC 325	AC7DX 324	CT1EEB 320	EA1JG 317	EA3CB 308	K2EEK 291	KC6AWX 276
IK8CNT 328	PAØXPQ 327	IKØIOL 325	KØHQW 324	OA4QV 320	N5HSF 316	EA3BHK 307	W6WL 291	SV2CWY 276
KØKG 328	KE4VU 327	YU1HA 325	K2JF 324	OE6CLD 320	KB1HC 316	VE3CKP 307	YB1RED 291	F5NBX 275
KZ4V 328	I1JQJ 327	W4NKI 325	OE7SEL 324	W5RUK 320	K6RO 316	N6AV 306	DJ2UU 291	VE2AJT 275
DJ9ZB 327	K9PP 327	VE3GMT 325	KC8EU 323	LU1JDL 320	WS9V 316	TI2TEB 306	4X6DK 291	US1IDX 275
OZ5EV 327	VE2WY 327	W4EEE 325	VE4ACY 323	KF8VW 320	W5NW 315	VE3DLR 306	WA3KKO 290	Z31JA 275
N7RO 327	K9PP 327	KE4VU 325	W2FGY 323					

RTTY

K2ENT 325	K3UA 298	I1JQJ 289	EA5FKI 284	YC2OK 280	W4QB 280	W4EEU 280	G4BWP 276	KE5PO 274
WB4UBD 309								
NI4H 305								

ingful contacts. Questionable contacts go into the paper log, but I usually keep at a particular DX station until I get a clearly acknowledged contact. If the contact is for an all-time New One, I continue to log callsigns worked after mine. If for some reason I have the wrong time or day, I have a list of 5 to 10 calls worked after mine. Even if my call is "busted" in the log (something that shouldn't happen if one properly exchanges information with the DX station), a QSL manager will usually give the DXer the benefit of the doubt in such a case. In other words, if W2CHO appears in the DX log, followed by 5 to 10 logged calls, most QSL managers will accept that the call in the log is wrong and issue the QSL card to WB2CHO (assuming W2CHO hasn't already requested a card).

As Steve sums it up: "If it is a new one for you, keep whatever data you can that allows you to make the case that you worked the operation until that QSL card is in your hand!" Excellent advice, Steve.

Another ARRL SSB DX Contest operation is headed for the British Virgin Islands. John, K3MD, and his son Mike, N3PUR, will operate from Trotolla in the British Virgins March 3–9 as **VP2V/K3MD**. They will run 400 watts into a three-element tribander and verticals. All contacts will be QSLed via the bureau from K3MD.

In other DXpedition news, look for Mart, DL6UAA, operating from Mauritius Island as **3B8/DL6UAA** March 22 – April 15, with a possible operation from Rodriguez 3B9. Mart has applied for special callsigns from both locations. No QSL route provided; check the usual DX information sources closer to the time of the operation.

Cedric, HB9HFN, plans to operate as **FW5FN** from Uvea Island (OC-054) in the DXCC entity of Wallis and Fortuna Islands. He plans operation on all bands, 160–10 meters, concentrating on CW, with some SSB and RTTY. The DXpedition web site: <http://www.qsl.net/hb9hfn/pacific99.html>. Logs and QSL requests will be available at <http://www.qsl.net hb9hfn/log/fw_search.html>. Cedric has made other Pacific DXpeditions as both 5WØFN and A35FN.

This is but a small fraction of the DXpeditions this month. Check the more timely sources of DX and contest information for more up-to-date lists of pending operations.

"The Daily DX" is a daily electronic DX newsletter, and it provides much of the DXpedition information for this column.

QSL INFORMATION

3A/N9NC to OM2SA
3B7RF to HB9RF
3D2RF to K6SLO
3D2RW to ZL1AMO
3W5FS to 7L1MFS
3W5JA to JA2JPA
4L2M to DJØIF
5A2A to DL3KDV
5W1CW to ZL1AMO
5W1JJ to K6VNX
6W1QV to F6FNU
6Y5/K1XA to W6RKC
7Q7OO to K6VNX
7Q7SB to AB4IQ
8R1/W1CDC to W6RKC
9G1RZ to K8JP
9MØC to G3SWH
9Y4/PA3BBP to PA3ERC
A92FX to K1SE
A92GD to K1SE
AY1DZ to LU6EF
AY4FC to LU6EF
AY5EIE to LU6EF
AY6EF to LU6EF
C4MA to 5B4KH
C6A/G4VXE to G3SWH
C6DX to WZ8D
CEØY to K6VNX
CQØVY to CT1VY
CQ1I to CT1FMX
CQ4FMX to CT1FMX
CQ5B to CT1FMX
CQ5QF to CT1QF
CQ5TM to CT1TM
CQ6RB to CT1RB
CQ6VY to CT1VY
CQ8LN to CT1LN
CQ8TM to CT1TM
CQ9FF to CT3FF
CR2LN to CT1LN
CR6SG to CT1TG
CS1BI to CT1XK
CS5ØØG to CT1REP
CS5FMX to CT1FMX
CS7QF to CT1QF
CS8FMX to CT1FMX
CS9FF to CT3FF
CT1XKI to CT1XK
CT5ØØD to CT1REP
CT5QF to CT1QF
CT8FMX/P to CT1FMX
CT98BMQ to CT3BMQ
CT98FMX to CT1FMX
CT98FTD to CT2FTD
CU1XKA to CT1XK
CU2V to DL3KDV
D2ASW to K4UTE
DU1ODX to NHØE
E21AOY/8 to 7L1MFS
EA8EA to OH2MM
EK88L to IK2DUW
ELØAB to K8JP
ET3BT to K1WYDXA
EX8F to DL8FCU
FG/PA3EWP to PA3ERC
FG/PA3FQA to PA3ERC
FM/PA3FQA to PA3ERC
FOØFI to K6SLO
FS/NØBSH to WW9DX
G4VXE to G3SWH
GD6YB/P to G3SWH
GIØPCU to K1WYDXA
GJ3RTE/P to G3SWH
GJ4VXE/P to G3SWH
GU6YB/P to G3SWH
GW4VXE/P to G3SWH
GX6YB/P to G3SWH
H23W to 5B4WN
HC8DX to K6VNX
HH5HR to K4UTE
HS7CDI to 7L1MFS
HS98AG to HS1CKC
J6/JA2EZD to 7L1MFS
J6/PA3BBP to PA3ERC
J6/S5ØR to S5ØR
J6DX to N9AG
J68AI to N8BJQ
J68AM to W8ILC
J68AR to K9JE
J68AS to N9AG
J68DD to N6JRL
J68GS to KI6T
J68ID to W8QID
J68LU to K9LU
J68MM to K9MMS
J68OK to W8OK
J68RR to S5ØR
J77C to PA3ERC
J79RC to PA3ERC
J79WP to PA3ERC
JG/PA3EWP to PA3ERC
JG/PA3FQA to PA3ERC
JT1FAW to K6VNX
JT1FAX to K6VNX
JY7Z to K6VNX
JY8RR to K6VNX
KG4QD to K4QD
KH4/KH6JEB to KH7RS
KH7/AH6DR to KH7RS
KH7/KH6JEB to KH7RS
KH7/WD8QGQ to KH7RS
KH7AA to KH7RS
KL3KIM to K1WY
KR6NR to W9WU
L2ØXSI to LU6EF
L8D/X to LU6EF
LU4XS to LU6EF
LU5EVB/Z to LU6EF
LU7X to LU6EF
M1BCG to G3SWH
NP3/NØBSH to WW9DX
NP4/NØBSH to WW9DX
OJØ/OH6LI to OH6LI
OJØ/OH8AA to OH6LI
P29AS to K6VNX
P29CC to K1WYDXA
PA3DMH to PA1AW
PJ2/OH6LI to OH6LI
PJ9CG to W6RKC
PQØZ to PY1NEZ
PS1Z to PY1NEZ
PS1ZZ to PY1NEZ
PU1Z to PY1NEZ
PV1Z to PY1NEZ
PXØZ to PY1NEZ
PX1I to PY1KS
PY1LVF/P to PY1NEZ
PY1MGM/P to PY1NEZ
RA3RQF to 7L1MFS
RK4WWQ to AA4NU
SVØLK to DJ4TR
SV9/G4VXE to G3SWH
T88II to KJ9I
TE4A to W9WU
TF8GX to K1WYDXA
TJ1BJ to K4UTE
TL5A to PA1AW
TL8DS to K4UTE
TO5C to PA3ERC
TT8XR to F5MXH
TU4DT to K6VNX
TZ6VV to AAØGL
UAØAOZ to K1WYDXA
UAØDC to K1WY
UA4WHX to AA4NU
UA4WIE to AA4NU
UI1B to G3SWH
UI8AA to G3SWH
UI9AWI to G3SWH
UI9BWR to G3SWH
UK8BWR to G3SWH
UK8R to G3SWH
V47NZ to WW9DX
V51Z to ZS6EZ
VE3/G4VXE to G3SWH
VK1TX to K1WYDXA
VP2MDY to NW8F
VP2MIU to W6RKC
VP2SX to W6RKC
VP2VI to W6RKC
VP5/AC4ET to K4UTE
VP5/NO4J to K4UTE
VP5/PA3FQA to PA3ERC
VP5/W3ZNB to K4UTE
VP5DX to K4UTE
VP5JP to K8JP
VP8CRB to K4QD
VP8TTY to K4QD
WH7/K9NW to WW9DX
WL9/WW9DX to WW9DX
XE7X to K6VNX
XR3J to HB9AOF
XU2A to 7L1MFS
XU2C to 7L1MFS
YA2A to K4UTE
YA3A to K4UTE
YA7A to K4UTE
YA8A to K4UTE
ZF2NT to N2AU
ZF2RC to PA3ERC
ZF9/ZF2RC to PA3ERC
ZF9/ZF2WP to PA3ERC
ZS6Z to ZS6EZ
ZS8IR to ZS6EZ
ZV1ZZ to PY1NEZ
ZWØZ to PY1NEZ
ZW1Z to PY1NEZ
ZX1Z to PY1NEZ
ZZØZ to PY1NEZ
3B8GF to Patrick Randamy, Allee Brillant, Vacoas, Mauritius
4F3FVA to Fidel V. Aragones, 405 Narra Street, El Rosario Village, Mabiga, Mabalacat, Pampanga 2010, Philippines
4F9EAQ to Eric Jose S. Rudinas, Blk. 31 Lot 30 Xavier Heights, Upper Balulang, 9000 Cagayan de Oro, Philippines
5H3GU to Gunnar Mathisen, P.O. Box 6643, Dar es Salaam, Tanzania
6W1AE to Radio Club du 23e Bataillon d'Infanterie de Marine, B. P. 3013, Dakar, Senegal
6Y5WW to William Reynolds, 4 Swallowfield Way, Gordon Pen P. A., Spanish Town, St. Catherine, Jamaica
9K2/SQ5DAK to Zbyszek Nawrocki, P.O. Box 7058, 32 091 Hawally, Kuwait
CT3KN to Ricardo Martins, Estr. Monumental, Edificio Varanda Lido 6-C, P-9000 Funchal, Madeira, Portugal
CU3DI to Pedro Pereira, P.O. Box 140, P-9702 Angra do Heroismo, Terceira, Acores, Portugal
CX3HU to Jose, P.O. Box 1, 65100 Young, Rio Negro, Uruguay
DS1DHP to Seung Kuk Lee, P.O. Box 12, Sihung, Kyunggi-Do 429-010, Korea
DS5XUA to Lee Eun Hee, 206-1 Dodong, Ullungeub, Ullunggun, Kyungbuk 799-800, Korea
DU1ODD to Lloyd Peter Taa, P.O. Box SM 121, Manila 1016, Philippines
DU9RG to Robin U. Go, 818 Acacia Avenue, Ayala Alabang Village, Muntinlupa City 1780, Philippines
HL1DH to Rim Dong-Yoon, Ju-Gong Apt. 205-705, Sang-Gye 6 Dong 740, Seoul 139-206, Korea
HL2IGU to Ahn Kwang-Phil, M. D., 526-2 Gan Seok Dong, Nam Dong Gu, Inchon 405-230, Korea
HL3ADI to Bae Jeong-Ho, P.O. Box 50, Taejon 300-600, Korea
HL4CUY to Jung Sam Jo, P.O. Box 272, Kwangju 501-600, Korea
HL5BDD to Sang Sun Park, P.O. Box 3, Hapcheon Gun, Kyeongnam 678-800, Korea
HL5FUA to Choi Jong Sool, 206-1 Dodong, Ullungeub, Ullunggun, Kyungbuk 799-800, Korea
HL5NXK to Hoeng Ryong Lee, P.O. Box 16, Dalseo, Taegu, Korea
HS3CSQ to Peerayut Parusuk, 23/37 Moo 7, Sukhumvit 105 Rd., Bangna, Prakranong, Bangkok 10260, Thailand
HS7CMJ to Miss Saijai Charoenkitkan, P.O. Box 9, Thamaka, Kanchanaburi 71120, Thailand
HV5PUL to Pontificia Universita Lateranense, I-00120 Citta del Vaticano, Italy
JD1BIA to Yo Takubo, Mikazukiso, Aza-Nishimachi, Chichijima, Ogasawara, Tokyo 100-2101, Japan
7K4QFS/JD1 to Toshiko Ueno, 2-14-16, Nishisugamo, Toshima-ku, Tokyo 170, Japan
JY4CH to Haitham B. Al-Sahen, P.O. Box 925253, Amman 11 110, Jordan
LX1KC to Kieffer Christian, 121, rue Klensch, L-3250 Bettembourg, Luxembourg
LX1NO to Norbert Oberweis, 5 Cite Oricher-Hoehl, L-8036 Strassen, Luxembourg
NHØE to Jose M. Salcedo, Jr., PR 565 Caller Box 10004, Saipan, MP 96950
OD5SX to Nabil Khayat, P.O. Box 180, Tripoli, Lebanon
SV1AMH to Dimitris Verrios, K. Theotoki 2, GR-111 41 Athens, Greece
SV1DKL to Maliakis Efstathios, 346A, Irakliou Ave, GR-142 31 Nea Ionia, Athens, Greece
SV1EMY to Korovezis Ioannis, 3 Kerkiras Street, GR-132 31 Petroupoli, Greece
SV2BBJ to Letsos Nick, Kallipoleos 4, GR-572 00 Lagadas, Greece
SX2THE to Radio Amateur Union of Northern Greece, P.O. Box 10483, GR-541 10 Thessaloniki, Greece
TG8AST to Carlos Sanchez, Apartado Postal 23, Coatepeque, Guatemala
TG8NAIM to Izabel Mena de Sanchez, Apartado Postal 23, Coatepeque, Guatemala
TG8NASQ to Juan Carlos Sanchez Mena, Apartado Postal 23, Coatepeque, Guatemala
TG8NASK to Geovany Sanchez Mena, Apartado Postal 23, Coatepeque, Guatemala
V73UB to Ben Leon, P.O. Box 525, Rindge, NH 03461
VU2FOT to M. Shanmugasundaram, 4/355-S. Edayarpalayam, Mettupalayam (H.O), 641 301 Tamil Nadu, India
VU2IIH to Indian Institute of Hams, P.O. Box 1927, Bangalore 560 019, India
YB1YMN to Mohd. Natsir, P.O. Box 214, Bekasi 17001, Indonesia
YC2LRM to Bima Sekti, Jl. Kaliwiru V/5, Semarang 50235, Indonesia
YC8BJK/9 to Jerry Katuuk, P.O. Box 623, Biak 98115-A, Indonesia
YC9WZJ to Joni Salim, P.O. Box 127, Sorong, Irian Jaya 98401, Indonesia
YM75IJ to Soyhan Erim, P.O. Box 82, TR-81031 Kiziltoprak, Istanbul, Turkey
ZA1Z to Dr. Dajlan Omeri, P.O. Box 1501, Tirana, Albania
ZP5MAL to Dr. Juan F. Duarte Burro, P.O. Box 34, Asuncion 1209, Paraguay

The table of QSL managers is courtesy of John Shelton K1XN, editor of The GOLIST, P.O. Box 3071, Paris TN 38242 (phone 901-641-0109; e-mail: <golist@wk.net>).

Say You Saw It In CQ

CQ DX Awards Program

SSB

2256 .....KF2ZO	2267 .....IK6GPZ
2266 .....IK8OZP	

CW

985 .....RW9SG

SSB Endorsements

320 .....W7OM/330	320 .....VE2WY/327
320 .....VE3MR/330	320 .....K9PP/327
320 .....4N7ZZ/330	320 .....W4LI/326
320 .....VE1YX/330	320 .....WDØBNC/326
320 .....YU1AB/330	310 .....N6RJY/319
320 .....XE1L/330	310 .....WS9V/316
320 .....K5TVC/330	310 .....W2FKF/315
320 .....VE3MRS/329	275 .....WG7A/290
320 .....VK4LC/328	275 .....K7HG/283
320 .....DL9OH/328	28 MHz IK8GPZ
320 .....OE2EGL/328	

CW Endorsements

320 .....W7OM/329	310 .....K8JJC/315
320 .....F3TH/328	310 .....YU1AB/312
320 .....4N7ZZ/326	250 .....N3KR/257
320 .....W1WAI/326	150 .....RW9SG/169
320 .....KA7T/324	

RTTY Endorsements

275 .....K3UA/298

Total number of active countries is 330. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

For more details on "The Daily DX," see <www.dailyDX.com> or call editor Bernie McClenny, W3UR, at 301-854-5650.

DX News and Events

Active DXpeditioner and long-time friend of DXers everywhere Mary Lou Brown, NM7N, passed away on Dec. 3, 1998 on her way home from the Lord Howe Island VK9LX DXpedition. Mary Lou had been Director of the ARRL Northwestern Division since 1995. She was Vice Director before that, and was a member of the ARRL's Executive Committee. She was 71 years old.

Mary Lou received her doctorate from Columbia University and taught physical education at the University of California at Berkeley before retiring to Washington state. She is survived by her husband, Bob Brown, NM7M, well-known propagation guru.

Effective April 1, 1999 the new Canadian Territory of Nunavut will begin to use the unique prefix of **VYØ**. The former prefix of VE8 will remain in use for the rest of Northwest Territories. Note that Nunavut will *not* be a separate DXCC "entity," as it doesn't meet any of the three criteria for a political entity. Nunavut is not a member state of the United Nations; it doesn't have a separate callsign block assigned by the ITU; and it doesn't have its own IARU society. Nunavut is very unlikely to ever meet any of these criteria, so look elsewhere for your next all-time New One.

The 1999 officers for the North Shenandoah DX Association are: President Gregory Lanham, KU4AN; Vice President John Kanode, N4MM; and Secretary/Treasurer Tracy Mawhinney, KF4ZFY.

The Redwood Empire DX Association, from Petaluma, California, announces the following officers for the 1999 term: President Al Burnham, K6RIM; Vice President Wally Pugh, N6AD; Secretary/Treasurer Bill Hillendahl, KH6GJV; Directors Joe Berkman, W6AIR, Rick Reiner, K6ZWB, and Chuck Ternes, N6OJ. Steve Bertsch, WA6YFD, will continue as the newsletter editor of "Sunspots."

Corrections

In the January column I described James Brooks, 9V1YC, as VS6WO. VS6WO is Steve Dubberstein; 9V1YC is a frequent guest operator at VS6WO. The St. Peter and St. Paul Rocks operation discussed last month has been indefinitely postponed, due to lack of funds.

QSL News

The South Pole station of **KC4AAA** has a new QSL manager, K1IED, who replaces NC6J.

QSL **5B4TI** via operator Mike Smedal, KD9AY, P.O. Box 22186, Ft. Lauderdale, FL 33335.

QSL Juan Carlos Veranes, **CO8TW**, direct via P.O. Box 8, Santiago De Cuba, CP 90100 Cuba, or via QSL manager W3HNK. Juan's e-mail address is <co8tw@co9nla.uo.edu.cu>. QSL Juan's 10 meter contest operation as **CO8HF** via P.O. Box 12, Santiago De Cuba, CP 90100 Cuba.

QSL **JX7DFA** via this new address: Per Einar Dahlen, Royskattveien 4, 7713 Sandvollan, Norway.

Steve Wheatley, KU9C, has taken over QSLing duties from JA1BK for the following operations: **BS7H** 1995, **XZ1A** 1995, **XZ1X** 1995, **VK9XM**, and **BS7H 1997** (Japan requests only; all others go to W4FRU.). Steve's address is P.O. Box 5953, Parsippany NJ 07054.

QSL **V63HC, V63YP, V63HO,** and **V63X** via KQ1F, and not via KA1S. Ann will forward mis-sent cards to Charlotte so there is no need to resend cards previously sent to WA1S.

3W5FM has a new QSL address: P.O. Box 37, Vladimir 600000, Russia.

QSL Delano Taylor, **C6AFV**, at P.O. Box F-43563, Freeport, Grand Bahama, Bahamas. This is an update from the information in the January issue.

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CIRCLE 49 ON READER SERVICE CARD

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

From The Mailbag

Every so often we tackle the stack of letters and inquiries we get from readers. Keep them coming, since it lets us know what your concerns are and what confuses you. This month we will answer a few of the letters that are of general interest to the amateur community.

Q: I heard that I am supposed to evaluate my ham station to be certain that I am not radiating more energy than is safe. How do I do it?— *Paul Wright, Toledo, OH*

A: First of all, amateur radio is generally safe, but there are isolated instances where the radio frequency emissions can exceed the FCC's RF exposure standard. New RF safety guidelines were adopted in 1996, which for amateur radio became effective January 1, 1998.

The new guidelines replaced the 1982 RF protection guides of the American National Standards Institute (ANSI) which had been used by the FCC since 1985. For amateur stations, the new policy requires that the station be subject to "routine evaluation" when it will be operated above certain threshold power levels (see Table I).

A routine evaluation is a formal determination as to whether the station conforms to the RF exposure requirements. In the past, although amateur stations were expected to comply with the FCC's guidelines, routine station evaluation was not required.

The good news is that you don't have to file any paperwork with the FCC. But new amateurs and those renewing their license must certify on their application that they have read and understand the RF exposure rules and will comply with them. Amateurs perform their own station evaluations.

The Maximum Permissible Exposures (MPE) vary with frequency, may be time averaged, and are dependent upon whether they occur in a controlled or uncontrolled environment. An uncontrolled environment is one that is accessible to the public—usually your neighbors. The most stringent requirements are at 10 meters and the VHF/UHF level.

Station evaluation required if transmitter power level exceeds:

MF	160 meters	500 watts
HF	80 meters	500 watts
	75 meters	500 watts
	40 meters	500 watts
	30 meters	425 watts
	20 meters	225 watts
	17 meters	125 watts
	15 meters	100 watts
	12 meters	75 watts
	10 meters	50 watts
VHF	6, 2, 1.25 meters	50 watts
UHF	70 cm	70 watts
	33 cm	150 watts
	23 cm	200 watts
	13 cm	250 watts
SHF	All bands	250 watts
EHF	All bands	250 watts

Threshold power levels in the Amateur Service.
Power is measured in Peak Envelope Power (PEP) input to the antenna.

Table I– For amateur radio stations the new policy requires that the station be subject to "routine evaluation" when it will be operated above certain threshold power levels.

To assist amateurs in performing the required station evaluation, the FCC has prepared and published OET Bulletin No. 65 and its Supplement "B," which contains all sorts of formulas, graphs, and tables. Admittedly, the new RF safety rules are very complicated. An easy way out is to use a computer program located on the Internet's World Wide Web at: <http://n5xu.ae.utexas.edu/rfsafety/>. The program uses formulas contained in OET Bulletin No. 65. You simply key four items into an online form: your transmitter power, antenna gain, distance from your station to the area of interest, and your frequency in MHz. The program will then let you know whether you are in compliance or not. There is even a link from this site to an online copy of the OET Bulletin No. 65 located on the FCC's Web site.

Stations using transmitter PEP power levels less than those shown in Table I are "categorically exempt" from having to perform an evaluation. All portable (hand held) and mobile transceivers are also exempt.

Q: How can I get a station callsign that matches my initials?—*Richard Jaspers, Paducah, KY*

I hear 1-by-1 callsigns on the amateur bands. How do I qualify for one?—*Sanford J. Collins, Altoona, PA*

A: We get more inquiries on station callsigns than any other subject! The FCC agreed to allow amateurs to select their own station callsign provided they met certain criteria and reimbursed the Government for the cost involved. Effective September 14, 1998, there is a $13 fee for an amateur station callsign selected by the user. The FCC reviews their costs every year and makes adjustments as warranted. The fee was $50 for a vanity callsign prior to last year!

Complete information about vanity callsigns is located on the FCC Web site at: <http://www.fcc.gov/wtb/amateur/vanity.html>. You file your request either on a paper FCC Form 610-V application or apply for it online by accessing the *Interactive Vanity Call Sign Application* located at <http://www.fcc.gov/wtb/amateur/vntyapp.html>.

If you file by paper, you must also attach an FCC Form 159 *Fee Remittance Advice*. If you apply online, a Form 159 will be printed for you from the Web site. The paperwork is sent to the FCC's fee contractor in Pittsburgh, Pennsylvania. Pay careful attention to the post office box numbers. Different box numbers are used depending whether you apply by document or online. You can pay by check or credit card.

You can choose up to 25 different callsigns in the order of your preference. The first assignable callsign on your list will be assigned to your station. It is a good idea to check one of the many online callsign databases to determine if the callsigns you want are available. You can also access the FCC's Amateur Service database located on the World Wide Web at: <http://www.fcc.gov/wtb/electcom.html>.

Some of the Vanity Call Sign rules are:

• The callsign must have been unassigned for at least two years.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443; e-mail W5YI@W5YI.org)

Say You Saw It In CQ

• If you are an amateur Extra class operator, each callsign must be in Group A, B, C, or D.

• If you are an Advanced class operator, each callsign must be in Group B, C, or D.

• If you are a General, Technician Plus, or Technician class operator, each callsign must be in Group C or D.

• If you are a Novice class operator, each callsign must be in Group D.

A Group A callsign has a 1-by-2, 2-by-1, or AA-by-2 format. Group B callsigns have a 2-by-2 format. Group C calls have a 1-by-3 format, and Group D have a a 2-by-3 format. For example, KA1AAA is a 2-by-3 (Group D) callsign—that is, two prefix letters, one area numeral, and three suffix letters.

Providing it is still unassigned, you may also reclaim a callsign that you previously held, or one held by a close relative now deceased. Certain callsigns are not available for assignment for one reason or another.

Club stations, but not military recreation or RACES stations, are also eligible for special vanity callsigns. Club stations, unlike individual stations, can obtain any number of vanity callsigns. Again, more information is available on the FCC's Vanity Call Sign Web site.

The W5YI Group offers a low-cost Vanity Call Sign filing service if you want to eliminate all the red tape. Call us at (toll free) 1-800-669-9594 if you want us to handle all of the details for you.

The 1-by-1 station callsigns are part of the new Special Event Call Sign System. A 1-by-1 callsign consists of one letter (either a K, N, or W), one numeral (zero through 9), and one suffix letter (A through Z, except the letter X) and are available for use by any amateur to commemorate a special event. For example, K1A is a 1-by-1 callsign. There are 750 available.

The special event is generally a one-time, non-recurring celebration, festival, anniversary, holiday, convention, dedication, public demonstration, and the like. Special event callsigns may not be requested just so that you will be able to have a short callsign during an upcoming amateur radio operating event or contest. The callsign may be reserved for up to 15 days. All amateurs, regardless of their license class, are eligible to request a 1-by-1 callsign.

To get one, you need to contact a Special Event Call Sign Coordinator. The easiest way to contact a coordinator is to go the <http://ncvec.spindle.net/> Web site which is maintained by the National Conference of VECs. There you will find all the FCC rules that apply to Special Event Call Signs and how to apply for one.

The W5YI Group is one of the FCC-approved Call Sign Coordinators. Just click on the link that says "Online Request" and you will be able to fill out a request for a callsign. The approval will be e-mailed back to you and the callsign reservation posted to the One-by-One Database. Be sure to read the FAQ (Frequently Asked Questions). There is no cost to reserve and use a Special Event Call sign.

Q: Now that the comment periods on the FCC's proposal to restructure the Amateur Service are over, how long will it be before we see some action? What is going to happen?—*Alan Bainbridge, Eureka, MO*

A: My guess is that we won't see anything on WT Docket No. 98-143 until late summer or early fall. That's the FCC's Notice of Proposed Rulemaking that looks toward streamlining the Amateur Service and eliminating outdated rules.

In the NPRM , the FCC proposed to reduce the number of amateur radio license classes from six to four. The Novice and Technician classes would be abolished, with the General class becoming the entry level into amateur radio.

The ARRL countered by suggesting further consolidation. The League wants to reduce the code speed for the General class from 13 to 5 words-per-minute and to 12 wpm for both the Advanced and Extra class.

The Volunteer-Examiner Coordinators (VECs) went a step further and recommended a top code speed of 5 wpm for the HF classes and only three license classes: no-code Technician, General, and Extra class.

The comment period closed on December 1st, reply comments on January 15th. It was hoped that the FCC would make a final ruling by the Dayton HamVention in May. That's when the FCC historically addresses the amateur community at their forum. But the FCC is in the process of moving their headquarters from downtown to southwest Washington, DC, so the process will probably take longer.

On the other hand, every two years the government has a campaign to reduce the regulatory hardship on its citizens. And this proceeding is one of the 31 initiatives that make up the Commission's 1998 Biennial Regulatory Review. This review seeks to eliminate or modify rules that are overly burdensome or no longer serve the public interest. Biennial Review items are supposedly on the "fast track," and that means faster action on rulemaking proceedings than is normally the case.

It is anybody's guess as to what amateur radio will look like a year from now. But a 5 wpm Morse code exam for the General class—and probably all classes

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—looks like a sure thing since it has the support of most of the amateur community. We will keep you posted.

Q: Why is it that fewer people seem to be entering the amateur radio hobby these days? Will this improve?—*Roger Staunton, Buffalo, NY*

A: Your observation is correct, and let's hope that it is only a temporary situation. Amateur radio is changing. Ten years ago the majority of all amateur radio operators held General class and higher licenses. Today most amateur radio operators hold no-code or slow code tickets. A decade ago the most popular license was General, with 25% of all amateurs holding that class. Now the no-code Technician class, which did not even exist ten years ago, is by far the most prevalent.

For the last five years there have been less code proficient amateurs than the year before. The trend is clear. It is away from Morse code operation. There are 25% less people taking amateur radio examinations than just a year ago.

Even though the Novice class is still with us, hardly anyone enters amateur radio at that level any more. The no-code Technician is by far the entry method of choice.

Hobby activities have changed. Amateur radio used to be a hobby of tinkering and experimenting. Today it is more communications and operating oriented. I personally feel that modern microprocessor and integrated circuit technology has gotten so sophisticated and complicated that the average amateur is necessarily relegated to operating commercially made radios rather than homebrewing. I used to be able to take apart and repair my own equipment. I take it to a professional now who basically swaps out modules. Fewer people are building their gear today.

And let's not forget the cellular phone and the Internet. The surge in their popularity began a few years ago and offers much of the magic of amateur radio—but without any government rules, Morse code, or license examinations. While computers and the Internet can be confusing and complicated, 60 million Americans seem to be doing just fine.

Yes, I think amateur radio will survive and prosper. There is a need for mobile people to be able to easily communicate with their family and friends. Also amateur radio is very valuable during emergencies and disasters when all other means fail.

There will be new modes and emissions in amateur radio, with more emphasis on new digital and spread-spectrum communications and less on 1970s vintage analog repeaters. The FCC is already planning to allow greater use of spread spectrum on the amateur bands. We will just have to wait and see what they have in store for us. It could be just the spark that gets people back on the amateur radio airwaves.

Q: When is the FCC's new Universal Licensing System coming and how will it impact ham radio?—*Robert G. Arnold, Marietta, GA*

A: The new Universal Licensing System, or ULS as it is known, has been in development by the FCC for a couple of years now.

The Amateur Service was the first to be automated. Now 60% of all license renewals and 100% of all new and upgraded licenses are electronically filed directly into the FCC's computer which houses the amateur database.

The objective now is for all radio services to electronically file into one massive database which will contain all radio services instead of into eleven separate databases. This will allow the number of FCC forms used by the various wireless services to be reduced from over forty to just five.

The Amateur Radio application Form 610 is to be replaced by an FCC Form 605 which will be used by Ship, Amateur, GMRS, and Commercial Radio operators. A separate form, or "schedule," applying to a specific service will be attached to the Form 605 much in the same manner that the income tax Form 1040 has various schedules that apply to certain people. The Amateur Service will use Schedule "D" for all license applications, including vanity callsigns.

We also heard that the VECs will be permitted to make up their own form for use in conducting examinations since the Form 605 only applies to licensing and not to VE exams. Right now the Form 610 does double duty. It covers both examination and licensing needs.

The new ULS system will use the Taxpayers Identification Number– in the case of an amateur, his or her nine-digit Social Security Number– as the "key" with which to identify the record. The problem is that not every FCC-licensed amateur has one. For example, foreign nationals may be FCC licensed but they don't have a Social Security Number. An alternate system for them is being worked on.

The FCC anticipates that the Universal Licensing System will be fully operational in all wireless services by the summer of 1999. We understand that the Amateur Service will be one of the last services to come under the ULS, since it is already filing electronically. At that time the average amateur will see a different form that asks for slightly different information. And some of the information previously asked will no longer be required.

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

48th Anniversary and Counting!

As I write this column, the famous ball in Times Square is beginning to drop and the New Year, 1999, is just seconds away. Now here it is, 1999, the last year of the 1900s. This March column will mark the 48th year that I have been Propagation Editor for *CQ* magazine, and the beginning of my 49th. In all that time, through war and peace, and from many parts of the world, I still have never missed a deadline for this column!

In March 1951, when I wrote my first column for *CQ*, sunspot Cycle 18 had passed its peak. I continued through the entire life of Cycles 19, 20, 21, and 22. Now, here I am still forecasting and writing through the rapidly increasing period of Cycle 23. That's a lot of writing over a very long period of time, but I am still going strong!

I have been as avid reader of *CQ* since the first edition of January 1945. Since my professional field was radio propagation, I found of particular interest the monthly "Propagation" column and articles written by the late Oliver Perry Ferrell. *CQ* was the first journal to recognize the importance of HF propagation predictions and forecasts for radio amateurs. Due to the pressure of a sporadic-*E* propagation research project conducted by *CQ*, Perry had to discontinue writing the "Propagation" column.

The column in *CQ* was badly missed, since propagation was not then readily available in any other form for radio amateurs.

In 1951, Gene Black, then Editor of *CQ*, asked me if I would care to resume writing the "Propagation" column. My first column appeared in the March 1951 issue, and the rest is history. I am eagerly looking forward to continuing to bring propagation information to the amateur radio community through the coming years.

Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a mean sunspot level of 74 for November 1998. This results in a 12-month running smoothed sunspot number of 59 centered on May 1998. This is an increase of two points from the previous month's level. The smoothed running numbers indicate the levels of a solar cycle.

During November daily levels of solar activity varied between a high of 114 on the 27th and a low of 33 on the 21st. Cycle 23 now appears to be picking up steam and is rising at a faster rate than it did earlier in the cycle. A smoothed count of 112 is forecast for this month.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 1998 was 137. This results in a 12-month running number of 114 centered on May 1998. The level of 10.7 cm flux is paralleling very closely the increasing activity of Cycle 23. A smoothed 10.7 cm solar flux level of approximately 138 is forecast for March 1998.

Table I shows each monthly smoothed sunspot number observed during Cycle 23 from its beginning in 1996 through May 1998. Predicted numbers are shown through the year 2000, with the peak of Cycle 23 expected to occur during March or April of that year with a count of 145.

March Propagation

One of the questions I have been asked the most during my 48 years as editor of this column is "What season of the year is best for DX propagation on the shortwave bands?"

This isn't an easy question to answer, since there are so many variables involved, and the answer could be different for different sets of conditions and for the various bands. In a general way, however, taking into account the overall number of hours that each band between 10 and 160 meters can be expected to open for DX, and the number of different areas of the world to which each band may open, I believe that the spring and fall months are optimum for DX propagation.

There is a solar-ionospheric relationship which helps to explain this. Spring and fall are the *equinoctial* seasons. These are the times when the sun is most nearly overhead at the equator, making

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 1999

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 4-5, 15, 26, 31	A	A	B	C
High Normal: 6, 8-9, 12-13, 22-23, 27	A	B	C	C-D
Low Normal: 1, 3, 7, 10, 14, 16, 19-21, 24-25, 28, 30	B	C-B	C-D	D-E
Below Normal: 11, 17	C	C-D	D-E	E
Disturbed: 2, 18, 29	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on the 1st, poor (D) on the 2nd, fair to good (C-B) on the 3rd, excellent (A) on the 4th and 5th, etc.

	1996	1997	1998	1999	2000
January		10	44	*105*	*144*
February		11	49	*109*	*144*
March		14	53	*112*	*145#*
April		17	57	*118*	*145#*
May	8*	18	59	*122*	*144*
June	9	20	*65*	*127*	*143*
July	8	23	*71*	*130*	*142*
August	8	25	*78*	*133*	*141*
September	8	28	*85*	*135*	*140*
October	9**	32	*91*	*139*	*139*
November	10	35	*96*	*142*	*136*
December	10	39	*100*	*144*	*134*

*Table I– Smoothed sunspot numbers recorded to date for sunspot Cycle 23. Numbers in italics are predicted values. * May 1996 marks Cycle 23's mathematical beginning. ** October 1996 marks the beginning according to a scientific consensus. # marks the expected peak of Cycle 23. (Data provided by the National Geophysical Data Center, Boulder, Colorado.)*

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HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Chart March & April 1999 Band Openings Given in Local Standard Time At Path Mid-Point (24-Hour Time System)

Band (meters)	*Distance From Transmitter (Miles)*			
	50-250 miles	*250-750 miles*	*750-1300 miles*	*1300-2300 miles*
10	*Nil*	09-13 (0-1)	07-09 (1) 09-12 (1-2) 12-13 (1-3) 13-16 (0-3) 16-18 (0-2) 18-20 (0-1)	07-08 (1) 08-09 (1-2) 09-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-21 (0-1)
15	*Nil*	07-09 (0-1) 09-15 (0-2) 15-19 (0-1)	07-08 (1) 08-09 (1-2) 09-15 (2-4) 15-18 (1-3) 18-19 (1-2) 19-23 (0-1)	07-08 (1) 08-09 (1-3) 09-15 (4) 15-18 (3-4) 18-19 (2-3) 19-21 (1-3) 21-23 (1-2) 23-01 (0-1)
20	11-13 (0-1) 13-16 (0-2) 16-19 (0-1)	08-09 (0-3) 09-11 (0-4) 11-13 (1-4) 13-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-22 (0-2) 22-08 (0-1)	06-07 (1-2) 07-08 (3) 08-09 (3-4) 09-18 (4) 18-19 (3-4) 19-22 (2-4) 22-00 (1-3) 00-02 (1-2) 02-06 (1)	06-07 (2) 07-08 (3) 08-10 (4) 10-15 (4-3) 15-22 (4) 22-23 (3-4) 23-00 (3) 00-02 (2) 02-04 (1-2) 04-06 (1)
40	06-07 (1-2) 07-09 (2-3) 09-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1)	06-07 (2-3) 07-09 (3-4) 09-11 (4-3) 11-13 (4-2) 13-15 (4-3) 15-20 (4) 20-22 (3-4) 22-00 (2-4) 00-03 (1-3) 03-06 (1-2)	06-07 (3-2) 07-08 (4-2) 08-09 (4-1) 09-13 (2-1) 13-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-00 (4) 00-03 (3-4) 03-06 (2-3)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-03 (4) 03-04 (3-4) 04-06 (3)
80	07-11 (4) 11-18 (4-3) 18-22 (4) 22-00 (3-4) 00-07 (2-3)	07-08 (4-2) 08-11 (4-1) 11-16 (3-0) 16-18 (3-2) 18-20 (4-3) 20-00 (4) 00-05 (3-4) 05-07 (3)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-03 (4) 03-05 (4-3) 05-07 (3-2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-03 (4-3) 03-05 (3-2) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (1-0) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

HAWAII March & April 1999 Openings Given in Hawaiian Standard Time

To:	*10 meters*	*15 meters*	*20 meters*	*40/80 meters*
Eastern USA	08-09 (1) 09-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 21-22 (1)* 22-01 (2)* 01-02 (1)*
Central USA	08-09 (1) 09-11 (2) 11-15 (3) 15-17 (4) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	09-14 (1) 14-16 (2) 16-19 (3) 19-23 (4) 23-03 (3) 03-06 (2) 06-08 (3) 08-09 (2)	19-20 (1) 20-22 (2) 20-02 (3) 02-04 (4) 04-05 (2) 05-06 (1) 22-23 (1)* 23-02 (2)* 02-03 (3)* 03-04 (2)* 04-05 (1)*
Western USA	08-09 (1) 09-11 (2) 11-12 (3) 12-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (4) 11-15 (3) 15-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	15-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3) 10-15 (2)	18-19 (1) 19-21 (2) 21-22 (3) 22-04 (4) 04-05 (3) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-04 (3)* 04-05 (2)* 05-06 (1)*

ALASKA March & April 1999 Openings Given in GMT

To:	*10 meters*	*15 meters*	*20 meters*	*40/80 meters*
Eastern USA	20-22 (1) 22-00 (2) 00-01 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	13-15 (1) 20-22 (1) 22-01 (2) 01-03 (3) 03-05 (2) 05-06 (1)	06-13 (1) 07-12 (1)*
Central USA	20-23 (1) 23-01 (2) 01-02 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 20-23 (1) 23-02 (2) 02-04 (3) 04-05 (2) 05-07 (1)	07-14 (1) 08-12 (1)*
Western USA	20-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3) 04-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (4) 04-05 (3) 05-06 (2) 08-10 (1)	07-09 (1) 09-12 (2) 12-14 (1) 09-10 (1)* 10-12 (2)* 12-13 (1)*

#See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
*Indicates best time for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
Note: The Alaska and Hawaii Propagation charts are intended for distances *greater* than 1300 miles. For shorter distances use the preceding Short-Skip Propagation Chart.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

night and day of almost equal length in all parts of the world. On March 21st and September 22nd each year the sun is directly over the equator, and the length of night and day is exactly equal everywhere.

The vernal, or spring, equinoctial period in the northern hemisphere has a noticeable influence on shortwave propagation conditions for a period of several weeks lasting from late February through late April. The effects of the autumnal, or fall, equinoctial period are felt from early September through late October.

During equinoctial periods it is always spring in one hemisphere and fall in the other. This tends to create an ionosphere of similar characteristics throughout more of the world than is possible during other times when it is summer in one hemisphere and winter in the other, and there are extreme differences in the ionosphere. This "ionospheric equalization" which takes place during the equinoctial periods is responsible for optimum DX conditions.

This improvement is most noticeable on long circuits between the northern and southern hemispheres—for example, from the United States to Australia, to South America, to southern Africa, to southern Asia, to Antarctica, etc.

During these seasons conditions are also optimum for long-path as well as short-path openings, and during gray-line twilight periods associated with sunrise and sunset.

Look for these optimum conditions during March on the shortwave bands.

During March it should be a toss-up among 10, 12, and 15 meters for the best DX band during the daylight hours from sunrise to sunset, with 20 and 17 meters not far behind. Some DX openings are also expected on the 6 meter band during the daylight hours. From sundown to midnight, DX honors will likely be shared among 20, 30, and 40 meters, with some good openings toward the west and the south also possible on 17 and 15 meters. On days when conditions are High Normal or better, even the 12 and 10 meter bands may remain open for DX towards the west and the south well past sundown. Also

Say You Saw It In CQ

check both 80 and 160 meters during this time frame for some good DX possibilities. In other words, between sundown and midnight DX may be possible on all shortwave bands between 10 and 160 meters!

Between midnight and sunrise, the best DX bands should be 30, 40, and 80 meters, with openings to many areas of the world also possible on 20 meters. The 160 meter band should also open for DX to many parts of the world during this time period.

March looks like a great month for worldwide DX propagation conditions on all the amateur shortwave bands. For more detailed information concerning band openings, refer to the DX Propagation Charts for March which appeared in last month's column. This month's column contains Short-Skip Propagation charts which are valid for both March and April 1999. These charts, which include data for Hawaii and Alaska, contain band-opening predictions for predominantly one-hop paths, ranging in distance from 50 to 2300 miles. For day-to-day changes in shortwave propagation conditions expected during March, see the Last-Minute Forecast at the beginning of this column.

VHF Ionospheric Openings

Many of the solar-ionospheric relationships which can produce ionospheric openings on the VHF bands tend to maximize during equinoctial periods.

The combination of rapidly increasing solar activity and the equinoctial effect should produce exceptionally good *F2*-layer DX conditions on the 6 meter band. Openings should be possible from the USA to almost all areas of the world during the month, particularly when conditions are High Normal or better. Signals from the northeast to the southeast should peak by mid-morning. Noontime should be best for openings towards the Caribbean, Central America, and the northern countries of South America. During the afternoon hours, expect 6 meter skip to extend deeper into South America and to shift towards the west and northwest. Exceptionally strong signals will occur at times. Trans-continental openings on 6 meters can be expected from approximately noon through the late afternoon hours.

Trans-equatorial (TE) usually improves considerably during the equinoctial period, and some 6 and possibly even 2 meter openings may be possible by way of this propagation mode during the month. TE openings must cross the magnetic equator at or near a right angle, and the best time for such openings is between 8 and 11 PM local time. Conditions favor openings between the southern tier states and the southern countries of South America, but some openings may be possible from northern states as well.

Auroral activity tends to peak during the equinoctial period, and there is a good chance for numerous VHF ionospheric short-skip openings by means of auroral-scatter propagation. Check the Last-Minute Forecast at the beginning of the column for those days that are expected to be Below Normal or Disturbed, as these are the days on which VHF auroral openings are most likely to occur during March.

Short-skip openings due to sporadic-*E* propagation usually pick up a bit during March. An occasional 6 meter opening should be possible via this mode over distances between approximately 1000 and 1300 miles. Sporadic-*E* type short-skip openings can occur during the hours of darkness as well as during daylight, but during daylight they may be masked by the more powerful *F2*-layer openings.

Not much meteor activity is expected during the month, although some VHF meteor-scatter-type openings may be possible for brief periods during minor meteor showers which are expected to peak on March 15–16 and March 25–26.

As I begin my 49th year as editor of this column, I again want to thank all of you who for over four decades have taken the time to drop me a line expressing an interest in radio propagation and this column in particular. The greatest reward an author can receive is feedback from his readers, and I have been humbled by the response over the years.

73, George, W3ASK

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9120	20 meters	9106	6 meters
9117	17 meters		

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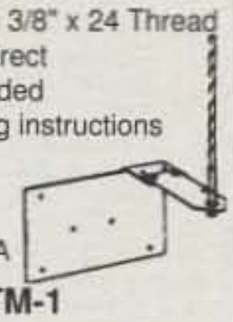

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Results *(from page 17)*

P2ØX: P29NB, P29MO, P29KPH, P29BM, P29ZJM, P29BW. **PI4CC**: PA3BAG, PA3BSQ, PA3EPD, PA3FVW, PA3GZX, PBØAIU. **PI4EUR**: PA3HCF, PE1PZS, PE1RQV, PDØSAJ, PD1AAH. **PY3MHZ**: PU3AGP, PY3AFS, PY3BZA, PY3MRZ, PY3PAZ. **RK3AWE**: RA3FF, RA3DKE, RA3DBT, RK3FM, RK3FT, RK3FS, RU3DGD. **RK4HYT**: RA4HBS, RX4HB, RA4HPI. **RK6AYN**: UA6AH, RN6BP, RV6ARU. **RK9AZZ**: RN9AS & RU9BZ. **RK9CWW**: RZ9CO, RA9CMO, RA9CKQ, UA9CDT. **RK9JWZ**: UA9JIJ, UA9JMD, UA9JMS. **RK9KWI**: UA9KJ, UA9KDZ, UA9KEK. **RK9SWF**: UA9SFR, RA9SG, RA9ST, UA9SDB. **RM6A**: RN6BN, RA6CO, RA6CM, RA6AX, UA6AAY, RX6BA, RA6YY, RW6YY. **RN4W**: RU4WJ, RW4WM2ZW & S58AB. **S59KW**: S53BM, S53MA, S59KW. **SKØUX**: SMØJHF, SMØTQX, SMØDRD. **SK6DG**: SM6RXZ, SM6ACE, SM6SIF, SM6TZD, SM6SMY, SM6TKT, SM6WKB. **SN6U**: SP6OPE & SP6NVK. **SP6YAQ**: Club Group.

SP9PRO: SP9EJ, SP9ERV, SP9LJO, SP9PT, SP9UON. **T91EZC**: T94KM & T92PRB. **TMØE**: F8BGV, F5OKD, FB1NAN. **TM1C**: F5ITK, F5TRO, F6CTT, F8AKS. **TM2OO**: F5PAC, F5RFF, F5PFT, F5LMK, F5PGO, F5FJL, F5UII. **TM2T**: F5NOD, F5PXT, F5PFP, F5SIH, F6JJX. **TM2V**: F6GLH, F6GYT, F1Ø881. **TP4CE**: F6FQK, F5JFU, F5JGM, F5JFA, F5LGF, F5PRL, F6BEC, F5RWE, F8AWE. **TS5I**: I5JHW, I5NSR, I5OYY, IK5FTQ, IK5JAN, IK5OSA, IK5ZTW. **UD6M**: UA6LO, UA6LV, RV6LNA, UT2IW, RA6AJJ, RA6LBX, RA4AJF/6, UT6IZ. **UPØL**: UN9LW & UN7LAN. **UT4UWC**: UT5UUF, US-U-ØØ7, US-U-Ø83, US-U-Ø9Ø, US-U-Ø21, US-U-Ø92. **UT7L**: UR4LRG, UR4LSB, UR4LTX, UR8LA, US4LGW. **UT7Z**: UTØZZ, UT1ZZ, UR7ZZ, UR5ZOS. **VA3SK**: VA3MW, VA3PC, VA3SK, VA3RTW, VA3BDR, VA3TWF, VE3XKB. **VE2CMH**: VE2FAL, VE2TPE, VE2HJG, VA2MP, VE2LOA, VE2RX.

VE3MIS: VA3's AJC, ESN, MDR, NAA, PIE, QMX, VE3ACN, CXT, ESN, FTA, GEA, GTT, GXQ, HEE, HTX, IMG, JMY, SQG, TKI, USC, VRO, XAP, XEL. **VE7ZZZ**: VE7CV, VE7EME, VE7PTT, VE7QO, VE7RBL, VE7SK. **VI6EWT**: VK6NU & VK6APK. **VK5GN**: VK5GN & N6AA. **VU2JNA**: VU3PVN, VU2RIG, VU2SVS, VU2CAV, VU2LNZ, VU2VPQ, VU2NLF. **W4AN**: W4AN & K4JNY. **W7IG**: KC7Q, N7HA, N7TL, W7SIR, KA7AGH, W7IG. **W7RM**: K5ZM, W7WA, KI7Y, AB7RW, KC7IWL. **WA1RR**: Club Group. **WEØF**: WEØF, NØLNO, KØDAS, WOØF, AAØBG, N7RET. **WM2V**: WM2V & K2KV. **WO8CC**: N8NR, N8BJQ, N9AG. **WR1X**: WR1X & KE1FO. **WR6WR**: N6WR, KO6DJ, K6FO, W6QEU, KF6OBS. **WV2LI**: N2GA & K2DO. **YB3ZES**: YD3BMB, YD3TYO, YC3SZM. **YE2B**: YCØFTD, YCØJBE, YCØJSQ, YCØLBK, YCØLCF, YCØLDA, YCØLUC, YFØBXX, YDØDGQ, YDØGOF.

Z39Z: Z31DX, Z31RU, Z32AF, Z32AM, Z32AV, Z32BU, Z32RS. **ZW5B**: , 9A9A. **AI4R**: AI4R, KE4RGH, WB2QLP, AD4TR, WA3TIH. **EA4URE**: EA1DOF, EA1QF, EA4BT, EA4BPJ, EA4CT, EA4ECF, EA4ET, EA4KD, EA5GRC, EA7JB, EA7PN, EA4KA, EB4EPJ, EB4AKI. **ED2RCA**: EA2BFM, EA2CBY, EA2ARW, EC2AFA, EA2ANG, EA2ABM. ED4RAX: EA4AHW, EA4ABW, EA7CD, EA4ANZ, EB4HAO, EB1ELE, EB1AYL, EB1AKV, EB7CJM. **J43PTR**: SV2DPJ, SV1CIB, SV3BSF, SV1CDN, SV3CGZ. JA1YPA: JA1ATK, JA1PEJ, JK1KOB, JF6OJX. **JA6ZPR**: JH6JSR, JH6SQI, JR6BSC, JR6CKX, JR6CKY, JR6HVE. **JH4WBY**: JH4UTP & JH4WBY. **KB1H**: KB1H, AA1CE, N1LYA, N1XYS, N1IXF.

This is the waterfront QTH of P49M, also known as Martin, VE3MR.

KG2M: KG2M, N2OX, KA2D, KB2REZ, KC2ACL, KG2LL, N2UHR, N2OOI, N2ZKB, KC2DBU, KB2YAO, KB2YAP, KB2ZLE, KC2CSL, KC2BPS. **KH7R**: KH6ND, KH6HKL, KH7R, KH7U, KH7L, KH7P, KH2D, K6GSS/KH6, WH6H, WH6R, WH6T, WH6XR, NH6XO, AH6LV, JG3KNP, NH6UY.

KO6N: N6RO, T94WW, K6AW, K3EST, N6IG, AEØM, K1KI, K2KW, JH1SBE, IK8ETA. **KP3P**: NP4Z, K9PG, KP4BZ, NP3A, KP3P, KP3L, KP4Y, WP3A, KP4ZZ, NP3HM, KP4RF. **KS3F**: W3PP, KE3ZR, N3WDL, NX3A, KS3F. **KU8E**: K8CC, K8GT, K8MM, KU8E, KE8OC, N8NX, N8CQA, W8MJ. **LU4FM**: LU1's FA, FB, FAK, FAM, FOW, FZR, LU2's FFD, FYU, LU3FP, LU3FR, LU4's FA, FGV, FPZ, LU5FAO, LU6's FA, FEC, FUQ, LU7FN, LU7FW, LU8FDZ, LU8FVS, LU9AUY, LU9FDG, LU9FIO, LU9FQT. **LY7A**: LY1EE, LY2NK, LY2BMX, LY2KZ, LY2AO, LYR-346, LY4AA, LY2NLL, LY2IF, LY3DA, LY2OC, LYR-728, LYB-26, A. Toleikis. **N5KB**: N5KB, KD5AYJ, KC5NYE. **OHØ/DK6QW**: DL3QQ, DL6YFB, DF8QJ, DK6QW. **OK1OKE**: OK1DXW, OK1FHL, OK1DUT, OK1FUT, OK1VBA. **OZ5W**: OZ1FTU & OZ1KRF. **P3A**: UA3TT, RZ3TX, UN7FZ, RA9JR, RA9JX, UA9JFG, UA9LAC, UA9MA, RZ9OA, UA9OTM, RZ9UA, UA9YAB, RAØAM, RVØAR.

RK2FWA: UA2FB, UA2FC, UA2FF, UA2FX, UA2FZ, RA2RA, RA2FZ, RN2FA, Andrej. **RZ3Q**: RW3QC, RW3QNZ, RU3QW, RX3QP, UA3QOQ, UA9XFY/3, RN3QO, UA4WIN/3. **SK6NP**: Club Group. **T42R**: CO2KG, CO2NT, CO2GQ, CM2KC, CM2II. **TF3IRA**: TF3GB, TF3AX, TF8GX, TF3HP. **VE5RI**: VE5FN, VE5WI, VE6FW, VE6GAM, VE6HMG, ex VE4RM VE6JY. **VK4IU**: VK4IU, VK4EMM, VK4XY. **XQ3PA**: Club Group.

Station Operators
Multi-Op Single Transmitter

3W6WE: K2WE & W2LK. **4U1ITU**: EA3FQV, EA3ATM, EA3AFW, EA3DUW. **4U1WB**: Club Group. **6V1C**: 6W1QV & 6W1RE. **9A5D**: 9A2FK, 9A3DU, 9A3ID, 9A3NY, 9A3VM, 9A4AQ, 9A4KS, 9A4NC, 9A4SG, 9A5DU, 9A5LU, 9A6KKB. **9A7A**: 9A7V, 9A8A, 9A2ME, 9A3TR, 9A4BT, 9A4PA, 9A4RX, 9A6DM. **9A7P**: 9A5AEI, 9A6NHH, 9A6NPM, 9A4GR. **9K9K**: 9K2RR, 9K2RO, 9K2ID, 9K2SS, 9K2SD, 9K2OK, 9K2HR. **A61AJ**: A61AJ & K3LP. **AA5NT**: AA5NT, K5PN, W5WW, N5NJ. **AB2DE**: AB2DE, KC2AVE, N2KPB. **AH2R**: JG3RPL, JI3ERV, JG3KAD, JH7XQJ. **AY6D**: LU2EU, LU3DW, LU3EEQ, LU8EWD, LU9EQ, LW4ETF, LW5DKY, LW6ETR, LW7EKM, LW8DJZ. **CO2BCC**: Roberto & Winston. **CT7O**: CT1ERK & CT1ETE. **DFØBS**: DL3NCI & DL9NEI. **DFØDFA**: DFØDFA, DL7UVO, DL7VDX. **DFØHTE**: DF7ATW, DH4SBO, DH5SBE, DL3SBI. **DK1NO**: DK1NO, DL1IAO, DL2MEH.

DLØBI: DK1QH, DL1YFF, DF6VI, DF9VF, DL8YFC. **DLØER**: DK3JW, DL6ECA, DL6EX, DL9LR, DF5EM, DJ9NA. **DLØRT**: DJ3SL & DL7AOS. **DLØSLZ**: DE1SLZ, DGØOMT, DH8WW, DL1AQU, DL3ARK. **DLØTS**: DF7EME, DJ9KM, DK7ZL, DF7PGF, DF7ZS, DK3SX, DL2FP. **DL3KZA**: DL3KZA & DL1KZA. **DL7UZO**: DL7UZO, DL7UVO, DL7VDX. **DX1CW**: 4F1FZ, DU3ALA, DY3MRT, 4F1GYE, 4D1PMD, DU1WHO, 4F1CJC, 4F1EBC. **DX1E**: 4F1EJD, DY1RAN, DY1KXF, DU1NUF, DU1MQA, DU1OOP, DY1FDD, DY1FYU, DU1RSM, DU1RGD, Richie, Nyssa, Eryl. **DX1RN**: DU1LER, DU1PUI, DU1OGD, DU1MDU, DU1ZSD, DU1PMK, DU1NRA. **EA1EEY**: EA1EEY, EA1CUB, EA1DZW, EA1CS, EA1BXW, EA1BTW. **EA4BHO**: Club Group. **EA4RKU**: EA4AD, EC4AGR, EC4AHY, Jesus, Raul. **EA5URL**: Club Group. **ED8CMT**: DF8XC, DL7AU, DL7UBA, DL7URB, DL7VRO, EA8AJX. **EN5J**: UU1JA, UU2JQ, UU2JZ, UU3JD, UU4JDX, UU5JR, UU8JY, UUØJX.

ES5Q: ES5MC, ES5MG, ES5QX, ES5RN, ES5RW, ES5RY. **EX9A**: EX2M, EXØM, EX8W, EX7NM. **F6KRK**: F8CIW & F8CHL. **G4KNO**: G3WUX, MØBOX, GØMKN, VE7CFD. **GW4BLE**: GW4BLE, GWØARK, GWØLKA, GWØRYT. **HA/WØYR**: WØYR & N9NC. **HB2CA**: HB9SL, HB9AIU, HB9DLE, HB9BGV, HB9BTL, HB9DDO, HB9CMZ. **HB5OK**: HB9FAQ, HB9OAB, HB9FBM, HB9FBS, HB9PUE, HB9CAT, HB9FBL, HB9DLV, HB9AGC. **HG1S**: HA1TJ, HA1DAC, HA1AH, HG1DAI, HA1DAE. **HLØZX**: Club Group IN-HA University ARC. **HS5AC**: Club Group. **II4T**: IK4MHB & IK4UPB. **IK7YTT**: IK7YTT, IZ7AUE, IZ7BJT, IZ7BFQ, IW7DCH. **IO2A**: I2IFT, IK2HKT, IK2XEF, IK2XSL, IK2CIO, IK2XRW. **IO2L**: I2OKW, IZ2AZC, IK2MLV, IK2PFL, IK2HAJ. **IQ7R**: IK7TYZ,IK7WPH, IK7VJZ, IK7LYL. **IQ9A**: IT9AJP, IT9CML, IT9INO, IT9STG, IT9TJH, IT9YHR. **IQ9K**: IT9KWF, IT9BLB, IT9EWG, IW9EKK.

IR4T: I4UFH, I4JMY, I4YSS, IK4IEE, IK2SGC, IK2QEI. **J8ØR**: EA2CLU, EA2BP, EA2ADJ. **JA4EKO**: JO1DFG, JI1UTP, JA4EKO, JG4CLV, JR5JAQ. **JE6ZIH**: JR6GKT, JI6BRB, JK6SEW, JL6MPR. **JF1SQC**: JF1SQC, JK1PKS, JH8KYU. **JH7AFR**: JA7WME, JH7AFR, JH7DNO, JI7NUF. **JI2ZEY**: JA2BIV, JA2BHJ, JA2BIL, JM2CCL, JQ2BBC. **JN1YUU**: Saori & Chisa. **K1TO**: K1TO & K8MR. **K5TR**: W5KFT, KM5FA, K5TR. **K6ZM**: K6WG, UZ3AYR, WB6MZQ. **KC1F**: KC1F & Packet. **KC7V**: KC7V, N7MB, N7TX, N7ZE. **KF9YT**: Club Group. **KI1G**: KI1G, K1NG, K1SD. **KL2A**: KL2A, KL7Y, WA2GO, WL7E. **KP2/WJ8C**: WJ8C & W7FKF. **KRØB**: NØBKL, KSØT, KJØB, KAØJZV, KBØKQA, AF9T. **KT3T**: KT3T & KT3O. **KT4W**: N4RV & KT4W. **KT6RA**: KT6RA & KD6KKP. **KU4BP**: KU4BP, N4VHK, WB4MSG, NØKTY, WB4KQN. **LP4H**: LU2HQI, LU4HMF, LU9HPN, LU9HXQ, LW1HBV, LW5HBR, LW6HAR, LW9HAB, LW9HBU.

LT1F: LU1FKR, LU3FZW, LU5CW. **LU3VAL**: LU2VDP, LU3UF, LU3VMS, LU8UE, LU8VDP, LU9VI. **LU6FBI**: LU1HF, LU6FAZ, LU6FBI. **LU7DCE**: LW8EZU & LW3DCE. **LX2LX**: LX2LX & LX1NO. **LX4B**: Club Group. **LX6T**: LX1SB & LX1KC. **LY2OM**: LY2OM, LY2BUU, LY2TX. **M8G**: GØLRY, GS, G3NAS, G3NKC, G3NLY, G3VHB. **N2JIX**: N2JIX & KF2ER. **N3VIA**: N3VIA & N3ZPE. **N4TO**: AE4SW, K4LQ, N4TO, WB4OSN. **N8DXR**: N8DXR & KB8YGP. **N9LYE**: N9LYE & N1ZRD. **N9THC**: N9THC & N9TZQ. **NA5B**: K5TT, W5AO, WØRRY, NA5B. **NE6N**: K6XC, KI7WX, W6ORD, W6AQ, W2CX, K6JYO, W6EEN. **NK7U**: NK7U & K7ZO. **NN6NN**: W6XK, NR6N, W6PS. **NP3P**: WP4NHM, KP2BH, KP3BE, NP3E, NP3H. **NR6R**: N6KI, 5B4WN, XE2Z, N6NC, WB6NBU, KR6NA, KF6NBH, W6MD, KM6XA, N6UZH, W5NYV. **NX5M**: NX5M, N5XJ, KG5YA, N4GCA, N5LKC. **NY4T**: NY4T, KE4KMG, KD4ZFU, KR4FO, KF4SNZ, KF4GNV, KF4GFZ, KF4KAP.

OE1W: OE1AKB, OE1AVC, OE1JNB, OE1PPA, OE1SOW, OE1TKW, OK3DZW, OE3KCC. **OG5F**: OH1JT, OH2HE, OH2IW, OH2JA, OH6CT, OH8KXK. **OHØW**: OH1EH, OH2XX, OH6EI. **OH5LF**: OH1WZ & OH5LF. **OH7AAC**: OH4XX, OH6LNI, OH7KIR, OH7MHL, OH7MS, OH7WV. **OK1KCF**: Club Group. **OK2KOD**: OK2BHM, OK2WAZ, OK2BDI, OK2BNX, OK2BJ. **OL5Q**: OK1FFU, OK1AYE, OK1FLC, OK1HDB, OK1HRA. **OL5T**: OK1TC, OK1DNR, OK1FLM, OK1HSK. **OM3KWZ**: OM7AC, OM7ARC, OM7CB, OM7AA, OM7AB, OM7ALH. **OM3Z**: OM3DX, OM8AW, OM8FF, OMØWR. **OM5M**: OM3BH, OM2RA, OM2KW. **OT8P**: ON4LAM, ON5OO, ON6AH, ON6VL, ON7LX, ON7PC, ON7ZV. **OZ5L**: OZ1KLC & OZ1KLD. **OZ7HAM**: OZ1ETA & OZ1BIZ. **OZ9KY**: OZ9AAR, OZ1EEZ, OZ1FKZ, OZ1DLD. **P2ØX**: P29NB, P29MO, P29KPH, P29BM, P29ZJM, P29BW. **PI4CC**: PA3BAG, PA3BSQ, PA3EPD, PA3FVW, PA3GZX, PBØAIU. **PI4EUR**: PA3HCF, PE1PZS, PE1RQV, PDØSAJ, PD1AAH.

PY3MHZ: PU3AGP, PY3AFS, PY3BZA, PY3MRZ, PY3PAZ. **RK3AWE**: RA3FF, RA3DKE, RA3DBT, RK3FM, RK3FT, RK3FS, RU3DGD. **RK4HYT**: RA4HBS, RX4HB, RA4HPI. **RK6AYN**: UA6AH, RN6BP, RV6ARU. **RK9AZZ**: RN9AS & RU9BZ. **RK9CWW**: RZ9CO, RA9CMO, RA9CKQ, UA9CDT. **RK9JWZ**: UA9JIJ, UA9JMD, UA9JMS. **RK9KWI**: UA9KJ, UA9KDZ, UA9KEK. **RK9SWF**: UA9SFR, RA9SG, RA9ST, UA9SDB. **RM6A**: RN6BN, RA6CO, RA6CM, RA6AX, UA6AAY, , S53MM, S53CC, S53ZO, S55OO. **S58AB**: S52ZW & S58AB. **S59KW**: S53BM, S53MA, S59KW. **SKØUX**: SMØJHF, SMØTQX, SMØDRD. **SK6DG**: SM6RXZ, SM6ACE, SM6SIF, SM6TZD, SM6SMY, SM6TKT, SM6WKB. **SN6U**: SP6OPE & SP6NVK. **SP6YAQ**: Club Group. **SP9PRO**: SP9EJ, SP9ERV, SP9LJO, SP9PT, SP9UON. **T91EZC**: T94KM & T92PRB. **TMØE**: F8BGV, F5OKD, FB1NAN. **TM1C**: F5ITK, F5TRO, F6CTT, F8AKS.

TM2OO: F5PAC, F5RFF, F5PFT, F5LMK, F5PGO, F5FJL, F5UII. **TM2T**: F5NOD, F5PXT, F5PFP, F5SIH, F6JJX. **TM2V**: F6GLH, F6GYT, F1Ø881. **TP4CE**: F6FQK, F5JFU, F5JGM, F5JFA, F5LGF, F5PRL, F6BEC, F5RWE, F8AWE. **TS5I**: I5JHW, I5NSR, I5OYY, IK5FTQ, IK5JAN, IK5OSA, IK5ZTW. **UD6M**: UA6LO, UA6LV, RV6LNA, UT2IW, RA6AJJ, RA6LBX, RA4AJF/6, UT6IZ. **UPØL**: UN9LW & UN7LAN. **UT4UWC**: UT5UUF, US-U-ØØ7, US-U-Ø83, US-U-Ø9Ø, US-U-Ø21, US-U-Ø92. **UT7L**: UR4LRG, UR4LSB, UR4LTX, UR8LA, US4LGW. **UT7Z**: UTØZZ, UT1ZZ, UR7ZZ, UR5ZOS. **VA3SK**: VA3MW, VA3PC, VA3SK, VA3RTW, VA3BDR, VA3TWF, VE3XKB. **VE2CMH**: VE2FAL, VE2TPE, VE2HJG, VA2MP, VE2LOA, VE2RX. **VE3MIS**: VA3's AJC, ESN, MDR, NAA, PIE, QMX, VE3ACN, CXT, ESN, FTA, GEA, GTT, GXQ, HEE, HTX, IMG, JMY, SQG, TKI, USC, VRO, XAP, XEL.

VE7ZZZ: VE7CV, VE7EME, VE7PTT, VE7QO, VE7RBL, VE7SK. **VI6EWT**: VK6NU & VK6APK. **VK5GN**: VK5GN & N6AA. **VU2JNA**: VU3PVN, VU2RIG, VU2SVS, VU2CAV, VU2LNZ, VU2VPQ, VU2NLF. **W4AN**: W4AN & K4JNY. **W7IG**: KC7Q, N7HA, N7TL, W7SIR, KA7AGH, W7IG. **W7RM**: K5ZM, W7WA, KI7Y, AB7RW, KC7IWL. **WA1RR**: Club Group. **WEØF**: WEØF, NØLNO, KØDAS, WOØF, AAØBG, N7RET. **WM2V**: WM2V & K2KV. **WO8CC**: N8NR, N8BJQ, N9AG. **WR1X**: WR1X & KE1FO. **WR6WR**: N6WR, KO6DJ, K6FO, W6QEU, KF6OBS. **WV2LI**: N2GA & K2DO. **YB3ZES**: YD3BMB, YD3TYO, YC3SZM. **YE2B**: YCØFTD, YCØJBE, YCØJSQ, YCØLBK, YCØLCF, YCØLDA, YCØLUC, YFØBXX, YDØDGQ, YDØGOF. **Z39Z**: Z31DX, Z31RU, Z32AF, Z32AM, Z32AV, Z32BU, Z32RS. **ZW5B:** PY5EG, PY5CC, PY5GU.

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SSD-6 160-80-40-20-15-10M Space-Saver Dipole, 71 ft. long.....= $146
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SSB RESULTS
QRP/p SECTION
WORLD WIDE

UR7M	**A**	**628,544**	**955**	**427**
LU1VK	**A**	**605,160**	**618**	**360**
YU1KN	**A**	**593,823**	**708**	**393**
UX3HX	*	502,918	678	377
LY2FE	**A**	**451,257**	**680**	**349**
S59D	**A**	**317,668**	**484**	**298**
NØKE	**A**	**316,744**	**450**	**289**
EA1GT	**A**	**251,335**	**460**	**301**
HA7YS	**A**	**234,300**	**461**	**275**
KB3TS	**A**	**188,079**	**318**	**213**
N7VY	**A**	**179,800**	**361**	**248**
N1TM	**A**	**177,813**	**321**	**207**
WA5OJI	**A**	**133,608**	**299**	**228**
W6YJ	**A**	**105,610**	**272**	**179**
YU1LM	*	93,399	274	191
WZ2T	**A**	**75,500**	**214**	**151**
NQ7X	*	71,292	225	156
SP3AGU	**A**	**48,285**	**227**	**145**
WB6FZH/KH6	**A**	**47,214**	**140**	**129**
JL3SBE	**A**	**30,464**	**117**	**112**
YO4AAC	**A**	**30,277**	**188**	**137**
EA3IW	*	26,334	124	99
JN2FSE	*	18,648	123	74
N8XA	**A**	**18,104**	**78**	**73**
N8WS	*	13,680	100	80
GM4ELV	**A**	**8,528**	**93**	**82**
AF9J	**A**	**8,094**	**89**	**71**
OK1AIJ	**A**	**7,424**	**72**	**64**
ABØCD	*	5,760	76	64
7K1CPT/1	*	5,750	51	46
VE7CQK	**A**	**3,564**	**47**	**36**
DL2YET	**A**	**2,952**	**42**	**36**
DL1DQY	*	2,108	36	34
JI7NHE	*	80	6	5
LU7VCH	**28**	**485,550**	**529**	**325**
LW3DWX	*	457,072	523	308
JA5GPJ	**28**	**85,675**	**237**	**149**
JA2DLM	*	35,696	146	97
ZV2WZV	**28**	**32,967**	**168**	**111**
		(Op: PU2RKM)		
WA6FGV	**28**	**27,258**	**136**	**77**
JA3LFK	*	24,160	120	80
W9PNE	**28**	**11,826**	**77**	**54**
HAØGK	**28**	**9,163**	**63**	**49**
4X6DK	**28**	**8,977**	**65**	**47**
ZY2RK	*	6,441	58	57
9XØA	**28**	**3,103**	**37**	**29**
2EØARM	**28**	**2,925**	**41**	**35**
FB1PMO	**28**	**2,688**	**34**	**28**
UAØZBK/RØ	**21**	**398,890**	**582**	**353**
VE7SBO	**21**	**269,230**	**408**	**247**
RA3RCL	**21**	**133,852**	**301**	**218**
JA6UBK	**21**	**116,756**	**246**	**202**
UR6EA	*	106,784	282	188
W4DEC	**21**	**82,770**	**104**	**178**
YC2OK	**21**	**30,104**	**120**	**106**
JR1NKN/2	*	28,322	130	98
JQ1AHZ/2	*	2,628	40	36
AA8UP	**21**	**2,280**	**30**	**30**
XE1HKR	**21**	**1,425**	**25**	**25**
RW9AB	**14**	**422,733**	**488**	**339**
W6CN	**14**	**88,560**	**243**	**205**
SP9EWO	**14**	**53,295**	**237**	**165**
OK2TBC	**14**	**43,512**	**184**	**147**
9A2KO	**14**	**41,340**	**190**	**156**
GWØVSW	**14**	**9,660**	**91**	**84**
WB7OCV	**14**	**4,420**	**54**	**52**
DL5ANS	**14**	**3,675**	**54**	**49**
VU3DJO	**14**	**3,198**	**55**	**41**
W8QZA/6	**7**	**15,368**	**74**	**68**
JP6FCF	**7**	**200**	**10**	**10**
SP4GFG	**3.7**	**80,500**	**231**	**161**
YU1KNO	**3.7**	**26,136**	**120**	**99**
SP3J	*	4,048	53	44
		(Op: SP3NGB)		
ES6RFC	**3.7**	**3,200**	**40**	**40**
UT5EER	**1.8**	**30,757**	**132**	**97**
VY2MGY/3	**1.8**	**14,400**	**80**	**45**
US7MQ	*	10,792	78	71
UA9JMB	**1.8**	**7,992**	**48**	**36**
YU1UA	**1.8**	**1,104**	**23**	**23**

SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

NB1B	**A**	**5,943,884**	**2278**	**788**
AD1C	**A**	**2,667,271**	**1390**	**619**
W1CU	**A**	**1,668,108**	**1108**	**578**
WC1M	*	1,225,150	994	535
W1RY	*	852,748	731	403
W1TE	*	727,301	700	379
KZ1K	*	651,756	608	408
		(Op: K1PLK)		
KD1YN	*	617,315	584	373
K1CN	*	552,445	575	353
W1WEF	*	343,987	489	313
AA1SU	*	314,028	438	286
K1MY	*	124,432	227	176
KA1GJ	*	91,180	226	188
K1TH	*	71,145	200	155
W1NHS	*	67,346	194	151
WS1M	**21**	**1,275,408**	**1000**	**521**
K1DWQ	*	205,486	307	254
WA1MKS	**14**	**123,615**	**236**	**201**
AA1KM	*	4,730	59	55
K1LZ	**3.7**	**1,373,240**	**933**	**440**
KE1Y	**3.7**	**1,248,450**	**899**	**435**
AA1BU	**1.8**	**39,760**	**268**	**141**
***WA1LNP**	**A**	**1,406,082**	**1064**	**529**
***WS1A**	**A**	**1,210,941**	**933**	**471**
***KD1KI**	**A**	**365,216**	**382**	**256**
*K1HT	*	332,760	422	235
*WF1L	*	328,322	505	334
*AB1BX	*	159,950	305	215
*K1VSJ	*	53,724	167	132
*K1TW	*	52,299	151	117
*K5MA	*	46,863	152	123
***WG1Z**	**14**	**136,566**	**295**	**249**
N2ED	**A**	**1,217,700**	**900**	**495**
NI2P	**A**	**631,182**	**624**	**354**
AF2K	**A**	**630,810**	**778**	**430**
WA1KKM	*	452,895	505	277
NA2A	*	374,144	480	316
WB2YQH	*	359,640	428	270
WR2V	*	338,706	432	279
N2CU	*	200,010	316	226
K2FR	*	180,557	300	221
AA2TN	*	118,164	263	172
W2HCA	*	118,131	235	169
N2CK	*	32,214	133	118
N2VM	*	21,141	100	81
KF2O	*	2,883	31	31
N2UB	**28**	**800**	**18**	**16**
KA2AEV	**21**	**3,896,775**	**2084**	**753**
K2UT	*	290,672	376	296
9K2HN/W2	*	1,209	50	39
N1CC	**14**	**490,599**	**552**	**433**
WB2OSM	*	369,754	502	343
K2SZ	**7**	**41,964**	**94**	**78**
***NA2Q**	**A**	**861,670**	**755**	**433**
***KG2AU**	**A**	**634,005**	**624**	**365**
***W2TZ**	**A**	**263,373**	**373**	**253**
*W2MKW	*	252,928	382	256
*WA2RZJ	*	181,185	307	235
*NX2D	*	121,155	267	197
*K2CS	*	100,408	227	163
*KF2VX	*	83,793	235	159
*W2FGY	*	60,480	168	126
*N2MUN	*	42,500	162	125
*KC2BMG	*	8,509	79	67
*K2DL	*	2,528	38	32
*WB2OQQ	*	1,862	40	38
***WA2BKN**	**28**	**3,689**	**41**	**31**
***KW2O**	**21**	**326,109**	**451**	**293**
***K2BQW**	**14**	**212,948**	**345**	**278**
***WB2DVU**	**14**	**42,880**	**145**	**128**
KQ2M	**A**	**7,443,720**	**2920**	**870**
KE3Q	**A**	**6,962,649**	**2962**	**849**
K3MM	**A**	**6,495,720**	**2696**	**836**
K3ZO	*	4,066,916	1902	674
W3AZ	*	305,286	406	246
N3RC	*	118,848	325	192
W3FQE	*	29,545	104	95
N3PBQ	**28**	**18,176**	**103**	**64**
NW3Z	**21**	**2,623,854**	**1654**	**642**
		(Op: KB3AFT)		
WA3DMH	**14**	**194,967**	**300**	**249**
W3KLG	*	48,250	145	125
		(Op: K3ND)		
***K1HTV**	**A**	**2,585,340**	**1468**	**636**
***K3PP**	**A**	**322,272**	**417**	**288**
*K3XZ	*	269,990	466	290
*AA3LX	*	192,240	349	240
*N3KCJ	*	178,200	300	220
*N3XQP	*	169,404	329	228
*N3UN	*	120,620	250	185
*KB3AGZ	*	99,640	227	188
*N3YEA	*	52,924	153	131
*N3TG	*	49,324	165	118
*KA3MYM	*	35,861	128	109
***W2BZR/3/T**	**28**	**78,848**	**228**	**148**
***W3CP**	**21**	**113,088**	**230**	**192**
***KW4T**	**7**	**197,064**	**331**	**238**
WC4E	**A**	**5,151,406**	**2599**	**829**
K4VUD	**A**	**3,403,400**	**1858**	**728**
AI2C	**A**	**2,375,753**	**1519**	**601**
K4JYO	*	1,883,700	1232	598
WA4TTI	*	1,096,983	829	467
KU4HZ	*	1,078,896	1041	494
NW6S	*	899,214	739	438
KR4TG	*	755,730	677	405
AG4W	*	605,183	653	367
K4LQ	*	572,020	565	370
NY4A	*	344,144	480	314
		(Op: N4CW)		
W3AU	*	271,659	379	249
K3OSX	*	228,684	355	236
W4UE	*	172,992	293	204
W1ENZ	*	155,376	300	208
KD4LHA	*	136,704	271	178
K4BAI	*	123,464	258	184
KS4XG	*	118,807	257	169
K4VV	*	87,316	200	166
KR4WS	*	69,984	203	144
KB4MIL	*	66,410	196	145
AD4G	*	50,479	214	143
AE4RO	*	44,577	153	127
W1LR	*	37,760	166	128
W4OGG	*	32,500	114	100
W4IF	*	26,505	102	93
N4MM	*	14,688	78	72
N4BP	**28**	**378,784**	**608**	**304**
W4WX	**28**	**157,000**	**334**	**200**
W9WI	*	78,390	230	130
KØEJ	**21**	**502,933**	**597**	**379**
WW4RR	**21**	**420,550**	**577**	**325**
		(Op: N4ZZ)		
K4YT	*	155,088	216	189
KF4LBD	*	16	4	4
NC4NC	**7**	**216,690**	**299**	**233**
AA4MM	**1.8**	**12,154**	**175**	**103**
***WO4O**	**A**	**1,193,297**	**910**	**497**
***KE4ZQZ**	**A**	**238,032**	**407**	**261**
***KU4FP**	**A**	**198,870**	**324**	**210**
*K1DCB	*	109,620	245	174
*AAØKO	*	109,032	236	177
*N4YKD	*	64,190	165	131
*W4YE	*	53,802	160	126
*WD4JNS	*	51,183	170	121
*NS4DX	*	41,019	143	113
		(Op: KT4CB)		
*W4JH	*	24,390	100	90
*N4SEA	*	23,821	106	83
*W3MGL	*	17,556	105	84
*WB4DNL	*	9,765	71	63
*AF4CO	*	1,021	28	28
***KB4OGM/T**	**28**	**39,858**	**154**	**91**
***KE4HXU**	**28**	**36,540**	**140**	**87**
*KE4MVK/T	*	1,554	90	74
*W9CNF/M4	*	44	4	4
***K4SN**	**21**	**868,560**	**857**	**461**
***N4MO**	**21**	**835,028**	**733**	**428**
*N4IG	*	100,980	217	180
*W4JIK	*	9,633	169	57
***KL7NL/WZ4**	**14**	**134,724**	**271**	**218**
AE5T	**A**	**1,262,194**	**1017**	**529**
K5RT	**A**	**1,159,225**	**1107**	**521**
K5UA	**A**	**776,205**	**720**	**423**
NN5ZZ	*	496,068	854	402
		(Op: N5LZ)		
NA5NM	*	291,924	521	306
		(Op: N5IA)		
KC5AK	*	226,160	341	220
W5GCX	*	178,416	366	236
AD4PU	*	146,874	454	269
KE4RHU	*	118,397	360	197
WB5ZAM	*	59,400	153	132
KC5WJM	*	17,724	111	84
KZ5MM	**28**	**710,636**	**972**	**404**
NN5AA	**28**	**264,500**	**517**	**230**
		(Op: K5NA)		
W5OXA	*	5,250	50	35
K5XR	**21**	**1,095,364**	**993**	**502**
		(Op: W5ASP)		
KN6M	**14**	**587,860**	**871**	**476**
NE5D	**7**	**931,856**	**728**	**419**
		(Op: K5RX)		
***WD5K**	**A**	**1,363,672**	**1000**	**542**
***W5MN**	**A**	**782,620**	**719**	**436**
***N5RXF**	**A**	**369,555**	**611**	**355**
*WA5IYX	*	228,846	403	258
*N5OKV	*	208,780	331	220
*KG5NE	*	183,416	307	227
*KF5YZ	*	49,400	171	130
*KK5CA	*	16,182	101	87
***NA5TR**	**28**	**46,500**	**178**	**100**
*KC5ZJA	*	17,856	93	64
*WA5VKS	*	4,680	44	36
***KØBCN**	**21**	**181,442**	**386**	**257**
***W5RNF**	**21**	**68,688**	**188**	**159**
***KN5L**	**21**	**47,628**	**175**	**147**
***NN5Z**	**14**	**139,815**	**297**	**239**
		(Op: K5PX)		
N5KO/6	**A**	**4,229,984**	**2257**	**671**
N6ED	**A**	**2,116,988**	**1480**	**628**
W6TK	**A**	**1,764,788**	**1222**	**566**
KI6CG	*	1,504,230	1296	546
K6BZ	*	1,251,488	1156	592
KC6X	*	1,094,512	1077	536
NG6O	*	1,027,701	905	459
		(Op: K5MM)		
WA5VGI	*	757,350	896	459
KN6Z	*	542,260	621	380
		(Op: K6DB)		
NN6XX	*	227,369	367	271
W6ISO	*	202,540	366	260
N6VH	*	169,644	312	201
K6GT	*	117,782	269	179
WB6NFO	*	112,800	270	188
NY6Y	*	55,342	162	134
KF6JFG	**28**	**41,679**	**179**	**99**
K6III	**21**	**146,496**	**312**	**218**
W6ZQ	*	27,405	130	105
W6OUL	*	20,336	97	82
AD6DO	**7**	**1,040,232**	**752**	**356**
***K6RO**	**A**	**1,188,770**	**926**	**505**
***WN6K**	**A**	**990,756**	**896**	**438**
***N1CS**	**A**	**267,270**	**553**	**302**
*W6PLJ	*	172,515	333	217
*KQ6ES	*	168,740	345	220
*W6HAL	*	165,270	271	210
*AA6PW	*	160,965	389	245
*KG6OK	*	124,610	247	170
*KD6DAE	*	123,648	300	192
*KQ6QW	*	110,166	285	183
*W6SA	*	88,065	245	171
*KO6XB	*	69,391	239	161
*W6ZL	*	39,711	150	93
*AD6Z	*	25,284	159	129
*N6JM	*	24,764	102	82
*W6RFF	*	12,180	73	58
*K6MCP	*	6,912	69	54
*N6TPT	*	2,132	50	41
*AA6EE	*	285	17	15
***K6KAY/T**	**28**	**57,054**	**195**	**111**
*KF6GUH	*	29,281	154	89
***WA7BNM**	**21**	**386,104**	**543**	**334**
***NP4IW/WX6**	**21**	**142,776**	**363**	**216**
***KU6T**	**21**	**117,351**	**270**	**221**
K7RI	**A**	**2,810,665**	**1805**	**715**
N7TT	**A**	**1,701,504**	**1356**	**633**
W7EB	**A**	**1,059,328**	**1162**	**512**
W8AEF	*	822,393	807	429
W7TSQ	*	621,023	650	403
KM7TM	*	385,434	550	342
KS7T	*	310,040	480	337
KC7UP	*	246,666	379	294
N6HR	*	212,160	320	260
W7QN	*	121,905	280	215
W7YS	*	100,956	260	188
W7LBN	*	62,016	170	136
W7HS	*	49,680	171	138
KA7TDH	*	42,601	174	113
W7AYY	**28**	**12,348**	**87**	**49**
W7UPF	**21**	**72,747**	**205**	**177**
W7FP	**14**	**634,908**	**720**	**471**
K7ZZ	**14**	**600,041**	**657**	**457**
W7RNF	*	120,600	245	225
***W7YAQ**	**A**	**543,840**	**545**	**412**
***WS7V**	**A**	**508,691**	**578**	**391**
***NY4I**	**A**	**221,374**	**451**	**289**
*AB7RW	*	167,832	325	252
*KN7T	*	75,250	279	175
*N7MOK	*	70,470	199	174
*KK7JP	*	50,325	197	165
*KJ7FE	*	41,736	181	148
*KC7ZRH	*	36,312	158	136
*KC5AC	*	24,360	128	105
*N7VT	*	12,160	80	80
*NS7K	*	8,568	90	72
***WJ7S**	**21**	**396,552**	**597**	**312**
***N7RQ**	**21**	**124,976**	**274**	**214**
***KG7XG**	**21**	**20,910**	**114**	**102**
K8WT	**A**	**3,631,375**	**1959**	**695**
W9LT	**A**	**2,249,496**	**1322**	**597**
K6ZX/8	**A**	**2,171,402**	**1424**	**622**
N8II	*	2,004,781	1306	571
KE8GG	*	1,025,545	858	463
WB8TLI	*	861,084	747	402
ND5S	*	805,396	700	454
WT8P	*	145,318	300	226
KD8SQ	**14**	**166,362**	**300**	**238**
W8SJU	**14**	**136,468**	**269**	**218**
***WW8DX**	**A**	**565,095**	**620**	**373**
			(Op: NE8Z)	
***KB8QO**	**A**	**189,560**	**360**	**236**
***KI8CS**	**A**	**188,163**	**320**	**207**
*AF8C	*	186,830	399	238
*N8YYS	*	126,666	252	186
*N8FWA	*	111,284	290	172
*N8WRL	*	75,036	211	148
*K8VUS	*	34,200	160	120
*N8WTH	*	31,204	158	116
*KC8FXR	*	20,582	103	82
*KC8HPL	*	17,155	100	73
*K8GMW	*	15,996	120	93
*AA8SN	*	13,832	91	91
*W8IDM	*	4,788	42	38
***N8UBK**	**28**	**9,168**	**65**	**48**
*W8TTS	*	8,771	64	49
***WZ8T**	**21**	**86,005**	**212**	**167**
WB9Z	**A**	**5,022,057**	**2238**	**821**
W9IW	**A**	**2,739,464**	**1685**	**689**
			(Op: ES2RR)	
WO9Z	**A**	**1,409,584**	**1076**	**541**
WY9L	*	606,871	648	373
			(Op: N9UA)	
KB9MDL	*	592,662	677	411
N9LCR	*	518,742	653	379
KBØC	*	468,384	535	328
WI9WI	*	319,800	539	28
W9BCV	*	203,357	300	209
K9UQN	*	185,703	311	239
WA9CCQ	*	155,142	314	221
KJ9C	*	113,505	233	161
WA9YSD	*	40,590	124	123
W9GIG	*	17,794	83	82
KK9A	**7**	**850,400**	**578**	**400**
***WO9S**	**A**	**808,411**	**749**	**433**
***NG9L**	**A**	**278,720**	**403**	**268**
*N9TU	*	122,740	278	190
*K9SH	*	102,120	237	184
*W9YS	*	74,800	201	136
*K9JE	*	68,355	201	147
*WB9LRK	*	38,640	149	112
*WT9U	*	14,910	91	71
***KB9JIF**	**28**	**5,148**	**50**	**36**
***N9SXT**	**21**	**201,500**	**315**	**250**
*AF9DX	*	97,559	209	181
*KF9VJ	*	8,250	60	55
KVØQ	**A**	**4,180,376**	**2090**	**724**
WØTM	**A**	**1,639,494**	**1182**	**582**
KMØL	**A**	**1,340,408**	**1105**	**548**
KGØZI	*	1,322,838	1360	561
WØRA	*	202,270	346	226
KØGAS	*	200,720	387	260
KØDAT	*	80,105	185	181
WØTT	*	57,625	163	125
WØPPF	*	37,620	153	110
KØBX	*	16,100	79	70
WØCEM	*	7,904	57	52
WIØWA	**21**	**849,676**	**849**	**444**
			(Op: WØETC)	
K9WIE	*	197,250	324	250
NØUU	*	123,458	252	206
WBØO	**14**	**519,466**	**707**	**438**
ABØGO	*	16,512	103	86
***ACØW**	**A**	**1,161,000**	**1008**	**500**
***KAØWWT**	**A**	**312,684**	**461**	**284**
***WAØDCB**	**A**	**112,117**	**250**	**191**
*KAØZPP	*	44,000	164	125
*N1YJD/Ø	*	26,334	137	114
***WØAH**	**28**	**68,508**	**218**	**132**
***KKØSS**	**28**	**54,936**	**188**	**109**
*KC7KDZ/T	*	624	16	13
***KGØUA**	**21**	**129,492**	**246**	**198**
*WØOF	*	8,784	67	61
*KCØAUJ	*	8,680	64	56
*KIØJZ	*	4,860	26	25
***AKØA**	**14**	**492,997**	**671**	**439**

BARBADOS

8P9IJ	**A**	**4,089,996**	**2219**	**652**
		(Op: VE3VET)		
***8P6CV**	**A**	**1,087,842**	**977**	**413**

CUBA

CO8TW	**21**	**63,195**	**245**	**165**
CO8HF	**3.7**	**120,690**	**210**	**135**

HAITI

HH2PK	**A**	**5,917,632**	**2599**	**777**

PANAMA

***HP1XBI**	**A**	**815,186**	**905**	**394**
		(Op: F2JD)		
***HO3A**	**A**	**698,535**	**787**	**361**
		(Op: KG6UH)		
***3E1DX**	**14**	**2,275,850**	**1774**	**575**
		(Op: HP1XVH)		

ALASKA

NL7Z	**A**	**2,383,260**	**1659**	**506**
KL1V	**A**	**2,098,978**	**1607**	**479**
KL7RA	**14**	**5,221,230**	**2576**	**805**

U.S. VIRGIN ISLANDS

***NP2DJ**	**A**	**52,998**	**169**	**121**

PUERTO RICO

WP3R	**21**	**10,167,632**	**3982**	**986**
		(Op: WA3FET)		
***WP4LNY**	**A**	**179,100**	**342**	**225**
*WP4KOE	*	57,330	203	126
***KP3O**	**14**	**25,220**	**105**	**97**

GREENLAND

OX3LG	**A**	**2,159,990**	**1386**	**590**

SABA IS.

***PJ8/W3EH**	**28**	**71,388**	**319**	**108**

CANADA

VO1MP	**A**	**10,406,374**	**3886**	**913**
VE3EJ	**A**	**10,216,934**	**3431**	**949**
VE7SZ	**A**	**8,617,752**	**3055**	**891**
		(Op: VE7NTT)		
VE3AT	*	5,239,472	2201	784
VY2LI	**A**	**2,109,888**	**1333**	**576**
VE1AIT	**A**	**526,851**	**547**	**351**
VE9MY	**A**	**304,830**	**386**	**270**
VE1TRH	*	301,735	436	259

VE7XO	*	249,368	345	244
VE3YB	*	151,662	254	161
VE4RP	**A**	**129,010**	**239**	**190**
VE6ZT	**A**	**116,560**	**283**	**188**
VE3KZ	**28**	**194,670**	**366**	**210**
VO1WET	**28**	**28,677**	**124**	**79**
VE7NKI	**21**	**315,476**	**527**	**266**
VE3ZD	**21**	**203,522**	**305**	**242**
VA3MM	**14**	**3,489,640**	**1739**	**770**
VE7IN	**14**	**1,706,432**	**1196**	**586**
VE7VX	*	1,116,348	998	492
VE3CDX	**7**	**1,446,720**	**765**	**411**
VE3BY	**3.7**	**555,550**	**605**	**271**
VE3BMV/1	**1.8**	**464,166**	**446**	**241**
VE3DO	**1.8**	**2,784**	**30**	**29**
***VE6JO**	**A**	**2,309,490**	**1533**	**603**
***VA3DX**	**A**	**2,155,202**	**1138**	**599**
*VE3WIB	*	873,892	741	394
***VO1IMB**	**A**	**784,128**	**709**	**384**
*VE6FR	*	743,996	711	407
*VA3JFF	*	690,768	559	328
*VE3STT	*	650,430	616	365
***VE2AWR**	**A**	**543,534**	**591**	**314**
*VE3BUC	*	487,500	534	325
*VA3SWG	*	412,419	468	287
*VE7TLK	*	398,268	592	276
*VA3NR	*	349,777	404	257
*VE2SAI	*	254,535	370	239
*VE2UFO	*	165,418	281	206
*VE3ZT	*	132,867	246	171
*VA3IX	*	129,387	280	177
*VE3SRE	*	101,576	232	206
***VE9WH**	**A**	**75,624**	**162**	**137**
*VE3NQK	*	23,141	102	79
*VE7YJ	*	5,640	48	40
***VE3HX**	**28**	**18,070**	**100**	**65**
***VE9DX**	**21**	**11,460**	**66**	**60**
***VE6TP**	**14**	**406,934**	**488**	**349**
***CY7A**	**3.7**	**943,272**	**769**	**287**
				(Op: VE7SV)
***VA3MG**	**3.7**	**346,896**	**441**	**216**
*VE3OIL	*	55,944	146	111
***VE7SV**	**1.8**	**10,472**	**72**	**44**

TURKS & CAICOS

***VP5E**	**A**	**6,831,902**	**3448**	**814**
				(Op: K6HNZ)

MEXICO

4A1AC	**A**	**646,613**	**955**	**319**
XE3LMV	*	409,683	637	277
***XE2SOZ**	**A**	**201,756**	**441**	**204**
*XE2HWH	*	15,840	114	72
***XE1FES**	**28**	**605,430**	**796**	**315**

MARITIME MOBILE

OK4BMT/MM	**A**	**425,040**	**560**	**330**

AFRICA

MAURITIUS

***3B8/DL6UAA**	**A**	**3,486,288**	**1974**	**592**

SWAZILAND

3DA5A	**A**	**8,423,856**	**3253**	**822**
				(Op: JM1CAX)

NIGERIA

***5N7YZC**	**A**	**133,176**	**248**	**186**
***5N3CPR**	**21**	**71,484**	**167**	**148**

ZAMBIA

9J2A	**14**	**7,907,625**	**2997**	**891**

MOROCCO

***CN8NK**	**21**	**1,318,640**	**1038**	**424**

MADEIRA ISLANDS

CT3BX	**14**	**7,329,366**	**2763**	**891**
CU3AD	*	342,875	526	325
***CT3HF**	**28**	**402,227**	**524**	**259**

CANARY ISLANDS

EA8ZS	**A**	**11,408,069**	**3710**	**881**
				(Op: EA3NY)
EA8LS	**28**	**1,151,590**	**933**	**418**
***EA8BXQ**	**A**	**927,990**	**800**	**378**
*EA8BGO	A	55,304	154	124
***EA8KL**	**28**	**99,308**	**225**	**148**

CUETA & MELILLA

EA9AM	**A**	**6,864,416**	**2864**	**754**
				(Op: AI6V)
*EA9AR	A	218,196	368	198
***EA9IB**	**28**	**549,783**	**561**	**333**
***EA9RY**	**21**	**125,286**	**266**	**157**

AFRICAN ITALY

IH9/OK1JR	**28**	**367,908**	**483**	**258**
IH9/OL5Y	**21**	**3,774,561**	**1863**	**679**
IH9/OK1MM	**3.7**	**1,356,642**	**683**	**333**

CHAD

***TT8JE**	**A**	**877,415**	**800**	**371**

IVORY COAST

***TU2CI**	**A**	**1,411,056**	**1002**	**478**

SOUTH AFRICA

ZS6SA	**A**	**4,188,839**	**1919**	**683**
ZS6BXN	**A**	**2,239,965**	**1379**	**547**
ZS5BBO	**14**	**424,505**	**496**	**295**
***ZS6PHD**	**A**	**286,895**	**405**	**245**
*ZS6HO	A	32,900	118	94

ASIA

AZERBAIJAN

***4J8DX**	**28**	**12,994**	**146**	**89**

GEORGIA

***TF1MM/4L**	**A**	**43,120**	**133**	**110**

ISRAEL

***4XØF**	**A**	**1,686,326**	**1276**	**446**
				(Op: 4Z5FL)
***4Z5FI**	**A**	**1,186,728**	**1003**	**394**
***4Z5FW**	**21**	**629,518**	**601**	**362**
*4Z5JQ	21	252,192	388	222

CYPRUS

C46A	**A**	**12,942,160**	**4438**	**847**
				(Op: 5B4ADA)
H27X	**21**	**5,925,940**	**2910**	**724**
5B4AGC	**14**	**5,197,770**	**2509**	**729**
H24LP	**7**	**4,087,536**	**1363**	**536**
				(Op: 5B4LP)

KUWAIT

9K2JH	**28**	**509,425**	**601**	**287**
9K2ZZ	**21**	**5,505,271**	**2608**	**769**

WEST MALAYSIA

***9M2TO**	**A**	**1,585,480**	**1508**	**520**
				(Op: JAØDMV)

EAST MALAYSIA

***9M6AAC**	**14**	**1,846,256**	**1343**	**464**
				(Op: OH2YY)

CHINA

BY1QH	**A**	**2,282,256**	**1848**	**587**
				(Op: OH2PM)
BPØRIW	**A**	**1,197,972**	**1966**	**428**
				(Op: JP1RIW)
BA4TA	**28**	**463,287**	**774**	**303**
***BA4TB**	**A**	**309,738**	**602**	**286**
***BD4DW**	**21**	**464,640**	**814**	**352**
*BD4SD	*	225,302	679	242

TAIWAN

***BV2FI**	**28**	**177,632**	**509**	**224**
*BV/JH3GCN	*	26,496	270	92

ARMENIA

***EK6CC**	**A**	**2,647,916**	**1628**	**556**

KOREA

HLØO	**A**	**272,996**	**415**	**278**
HL5BPF	*	110,352	277	176
6KØIS	**14**	**49,861**	**294**	**119**
				(Op: HL1IWD)
***HL5BUV**	**A**	**78,416**	**221**	**169**
***HL5AP**	**28**	**16,716**	**90**	**84**

THAILAND

***HSØ/JA1IZ**	**A**	**41,552**	**292**	**112**
***HSØ/VK3DXI**	**21**	**305,466**	**451**	**294**

JAPAN

JH4UYB	**A**	**4,884,036**	**2173**	**734**
JA1YNE	**A**	**1,973,272**	**1273**	**569**
JA2BNN	**A**	**1,616,176**	**1133**	**507**
JM1XCW	*	1,585,969	1055	479
JA2ZJW	*	1,558,760	1075	532
				(Op: JH2CMI)
JA6ZLI	*	1,124,040	932	456
				(Op: JJ6WYS)
JAØQWO	*	1,002,014	849	442
JA5APU	*	493,116	544	327
JA2AXB	*	386,467	485	293
JR1LEV	*	334,789	443	283
JA1HP	*	166,054	339	203
JR7LVK	*	50,427	150	117
JA5GSG	*	23,580	99	90
JA2QVP	*	1,044	18	18
JH6AUS	**28**	**365,472**	**527**	**282**
JH8UQJ	*	22,608	131	96
JH2AQI	*	7,659	77	37
7M4BEN	**21**	**2,822,680**	**1572**	**680**
JR8VSE	**21**	**907,680**	**787**	**480**
JHØEPI	*	813,698	719	419
JI2QKJ	*	330,285	419	291
JA1NFD	*	94,350	207	170
JGØOXL	*	30,179	121	103
JA7BEW	**14**	**826,500**	**647**	**475**
JH1AZO	**14**	**116,701**	**245**	**191**
JA2CWU	*	77,592	209	159
JA3ORD	*	4,592	50	41
JH1TUX	*	1,872	31	26
JF2FIU	*	1,798	31	29
JA3CE	**7**	**1,368**	**35**	**19**
JL6IPK	*	260	14	13
JR3BVX	*	6	1	1
JH1AEP	**3.7**	**24,054**	**90**	**57**
***7N3ULM**	**A**	**1,912,408**	**1273**	**554**
***JA7NVF**	**A**	**1,204,082**	**956**	**458**
***JR7WAB**	**A**	**667,875**	**681**	**375**
*JJ1VRO	*	646,527	621	357
*JF1RWZ	*	301,080	407	260
*JH1UUT	*	275,082	423	254
*JHØGHZ	*	254,178	390	243
*JN1NOP	*	219,186	369	243
*JE1UFF	*	212,440	360	226
*JH2AMH	*	206,498	335	223
*JG1TVK	*	173,020	295	211
*JA1XUY	*	166,870	320	205
*JH5OXF	*	127,575	265	189
*JH6FTJ	*	123,648	247	184
*JA3UWB	*	116,390	299	209
*JR1MRG	*	108,072	362	158
*JG2REJ	*	101,728	196	176
*JI7VUR	*	95,375	202	175
*JA4BAA	*	89,474	205	166
*JA2OJ	*	89,436	199	514
*JL2HUJ	*	79,124	220	151
*JA1AB	*	65,076	199	132
*JE8KKX/1	*	48,633	142	129
*JH7IPR/6	*	44,958	154	118
*JA1MQS	*	41,412	130	119
*JA9EJG	*	40,414	137	121
*JH2WHS	*	38,184	146	111
*JA8TEZ	*	34,540	133	110
*JH7XVB	*	33,535	125	95
*JA2GHP	*	25,721	136	89
*JHØHON	*	19,904	103	64
*JH1RMH	*	13,736	83	68
*7M1QYH	*	12,070	78	71
*JA1XPU	*	11,966	93	62
*JA1STY	*	10,335	67	65
*JH2IJC	*	7,155	57	53
*JA7KM	*	7,144	55	47
*JA1MXY	*	5,986	51	41
*JJ1JRH	*	5,576	61	41
*JEØVFV	*	4,662	42	37
*JJ2TKX	*	4,218	44	37
*JK8FRL	*	3,864	44	42
*JE7DOT	*	3,360	36	32
*JN2WYE	*	2,604	43	31
*JA1KAL	*	2,368	36	32
*JK8HOS	*	2,208	33	32
*JAØGZ	*	1,512	24	24
***JA2BY**	**28**	**75,260**	**220**	**142**
***JA2IU**	**28**	**42,320**	**164**	**115**
*JA6EFT	*	41,470	159	110
*JAØRYN/7	*	28,301	127	91
*7N2UQC	*	22,356	116	81
*JA5PQ	*	21,500	106	86
*JS1KQO	*	19,592	109	79
*JA1AAT	*	11,704	80	56
*JG1RDV	*	8,619	67	51
*JA4AQR	*	7,920	58	55
*JF5FGY	*	7,150	60	50
*JJ3OOZ	*	5,080	53	40
*JK1OXU	*	840	20	20
***JR3RIY**	**21**	**1,028,193**	**815**	**471**
***JR7OMD/2**	**21**	**903,960**	**750**	**465**
*JE1LFX	*	795,984	739	412
*JA6WFM	*	708,820	658	427
*JL3VUL/3	*	699,447	696	399
*JR9NVB	*	538,284	541	372
*JH7NPF	*	495,936	550	336
*JS1OYN	*	199,698	321	249
*JA3LEZ	*	128,700	240	198
*JH6TYD	*	128,600	235	200
*JA6BIF	*	124,028	237	202
*7M2CAG	*	100,926	207	178
*JJ3XHT	*	99,550	219	181
*JL1MWI	*	97,125	235	175
*JA9SCB/1	*	49,140	160	135
*JA2XOA	*	26,732	134	82
*JE9JPY	*	22,632	101	92
*JR1LQK	*	22,339	100	89
*JA3BBG	*	21,844	96	86
*JA2KPV	*	15,960	81	70
*JI8GZS	*	12,006	72	69
*JG1GCO	*	10,248	64	61
*JA1JLP	*	7,500	50	50
*JM6EBU	*	5,734	52	47
*JK1BII	*	5,684	56	49
*7K1EQG	*	5,130	50	45
*JG5VIA	*	5,060	50	46
*JI1RCB	*	3,240	39	36
*JR3KAH	*	2,924	38	34
*JA6QDU	*	2,106	27	26
*JF2PXB	*	2,044	34	28
*JR1BSV	*	774	21	18
*JM2BHI	*	192	8	8
***JA7AMK**	**14**	**441,600**	**569**	**320**
***JR2LIS**	**14**	**288,860**	**420**	**286**
*JR7WFC	*	230,574	346	249
*JA4XRN	*	11,842	73	62
*JE1GZB	*	3,816	44	36
*JK1LUY	*	8	2	2
***JA2NNF**	**7**	**14,580**	**57**	**54**
*JP6GQN	*	1,380	16	15
***JE1SPY**	**3.7**	**2,852**	**37**	**31**
*JQ1UKK/7	*	420	10	10
*JI4HKA	*	24	2	2

OGASAWARA

***JD1BIA**	**21**	**6,670**	**107**	**58**

JORDAN

JY9QJ	**A**	**2,648,940**	**1493**	**530**

LEBANON

***OD5NJ**	**A**	**1,342,693**	**972**	**407**

TURKEY (ASIATIC)

YM2ZW	**14**	**2,428,125**	**1582**	**555**
				(Op: OK2ZW)
***TA3BN**	**A**	**1,680,265**	**1182**	**437**
*TA7HA	*	25,130	90	70
*TA4BN	*	19,057	70	59
***TA3YJ**	**21**	**158,859**	**315**	**171**
***TA3J**	**3.7**	**356,380**	**306**	**206**

ASIATIC RUSSIA

RA9JW	**A**	**626,773**	**621**	**391**
UA9BT	**A**	**596,288**	**564**	**352**
UAØSE	**A**	**545,139**	**621**	**357**
UAØUAG	**A**	**218,918**	**584**	**266**
RA9YA	*	144,600	274	200
RUØAT	*	41,528	130	116
UAØSR	**28**	**186,924**	**551**	**222**
RAØFU	*	60,681	234	113
UA9CL	**28**	**7,744**	**78**	**64**
RW9OW	**21**	**1,926,873**	**1679**	**559**
RZØSR	**21**	**1,719,295**	**1450**	**565**
UAØDC	**21**	**859,040**	**970**	**455**
RXØAE	*	117,414	300	198
RZ9CX	*	110,112	226	186
UAØWY	**14**	**1,952,286**	**1220**	**602**
RA9DX	**14**	**1,851,724**	**1233**	**574**
RV9JR	**14**	**1,161,776**	**892**	**506**
RW9QA	*	259,827	357	257
RV9UF	*	164,351	290	223
RU9FD	*	100,100	244	182
RA9XF	*	41,880	137	120
RA9AA	*	24,225	101	95
RNØA	**7**	**1,701,678**	**859**	**437**
				(Op: UAØAGI)
RZ9UGN	*	69,462	124	102
UA9ACJ	**3.7**	**226,772**	**236**	**178**
***UA9CAW**	**A**	**2,168,656**	**1223**	**536**
***UAØSJ**	**A**	**1,840,608**	**1415**	**581**
***RAØFF**	**A**	**1,032,190**	**900**	**466**
*UAØFDX	*	338,720	554	290
*UAØJDD	*	200,282	434	239
*RW9RF	*	172,845	305	207
*RA9MC	*	130,968	260	214
*RU9UG	*	32,330	120	106
*UAØAPP	*	15,006	107	82
*RAØCL	*	5,546	60	47
***RX9UTB**	**21**	**188,760**	**467**	**260**
***UAØJH**	**14**	**1,508,874**	**1171**	**579**
***RZ9UC**	**14**	**700,344**	**700**	**411**
*RA9XU	*	100,006	216	174
*RX9UKF	*	46,728	147	132

KAZAKHSTAN

UN8RA	**A**	**411,822**	**480**	**274**
UN9FD	*	161,028	310	213
***UPØF**	**A**	**1,564,640**	**1254**	**508**
				(Op: UN7FK)
*UP5F	*	396,718	486	301
				(Op: UN7FW)
***UN5PR**	**21**	**1,613,924**	**1271**	**533**
***UN7D**	**14**	**487,485**	**537**	**345**

HONG KONG

VR98BG	**28**	**38,081**	**260**	**113**

INDIA

***ATØPTT**	**A**	**1,081,584**	**937**	**444**
				(Op: VU2PTT)

EUROPE

CROATIA

9A3ZG	**A**	**300,657**	**491**	**309**
9A3JI	**28**	**91,938**	**241**	**154**
9A5Y	**21**	**3,472,700**	**1859**	**770**
				(Op: 9A3LG)
9A6KOI	**7**	**932,844**	**795**	**407**
9A9D	**3.7**	**484,288**	**659**	**329**
***9A6ACY**	**A**	**705,591**	**482**	**279**
***9A2YC**	**A**	**602,496**	**621**	**384**
*9A5J	*	316,050	536	301
*9A3SM	*	126,876	281	218
*9A3ZO	*	17,512	108	88
*9A5MT	*	12,410	80	73
***9A3B**	**21**	**1,230,488**	**13**	**511**
				(Op: 9A1AA)
***9A4RV**	**14**	**38,570**	**191**	**145**
*9A4VV	*	38,036	200	148
***9A4RU**	**3.7**	**335,232**	**525**	**291**

PORTUGAL

CT1EDJ	**A**	**19,135**	**100**	**89**
CT98EEN	**28**	**663,536**	**756**	**367**
CT98BOP	**21**	**5,560,698**	**3059**	**858**
CT8T	**21**	**4,046,224**	**2447**	**794**
				(Op: CT1DVV)
CS98NH	**14**	**4,043,033**	**2649**	**829**
CS98SL	*	501,270	510	330
CT98BNW	*	347,400	388	300
***CT98ELF**	**A**	**81,600**	**230**	**160**
***CQ7ELP**	**28**	**363,022**	**554**	**319**
*CT2GFK	*	22,794	120	87
*CT1CLR	*	20,461	96	79
*CT2GFQ	*	3,366	38	34
***CS98MS**	**21**	**257,770**	**663**	**298**
*CT1FLD	*	85,759	413	191
***CT1FNT**	**3.7**	**4,056**	**52**	**39**

GERMANY

DL6FBL	**A**	**6,587,136**	**2827**	**864**
DJØFX	**A**	**5,617,152**	**2499**	**848**
				(Op: OE2VEL)
DL3TD	**A**	**5,362,434**	**2450**	**803**
DL4MCF	*	2,995,118	1881	698
DK9DA	*	2,566,635	1536	695
DK2OY	*	2,367,675	1557	619
DJ8UV/P	*	1,006,858	985	479
DL2YAK	*	775,852	788	458
DL9DYL	*	592,893	623	369
DL1JPL	*	531,216	630	312
DL8AAE	*	489,155	603	361
DL3ABL	*	361,179	509	343
DL4VAD	*	283,662	415	306
DJ2YE	*	250,040	423	266
DL2DBH	*	117,987	259	201
DJ2IA	*	75,768	214	164
DK5KJ	*	68,052	200	159
DL7YS	*	60,494	175	149
DL6MHW	*	39,308	154	124
DL6AG	*	35,340	124	114
DK5AD	*	21,294	100	91
DK3ML	*	20,330	106	95
DL7VPO	*	20,068	152	116
DK7AN	*	14,219	84	59
DF5RF	*	6,282	79	49
DL5AUJ	*	689	14	13
DH1PAL	**28**	**39,235**	**155**	**95**
DKØTZ	*	11,505	80	59
				(Op: KB9OAK)
DJ6QT	**21**	**2,095,192**	**1299**	**638**
DL6ZFG	*	47,085	147	129
DL9ZWG	*	27,089	118	103
DL8PC	**14**	**2,013,350**	**1358**	**670**
DL8UD	**14**	**1,432,512**	**1167**	**576**
DL1YAW	*	1,393,574	1107	589
DF4SA	**7**	**70,200**	**147**	**130**
DL7VMM	**3.7**	**54,372**	**179**	**138**
DK4UA	**1.8**	**77,688**	**265**	**166**
***DK6BT**	**A**	**411,257**	**559**	**343**
***DK5DS**	**A**	**352,118**	**513**	**324**
***DL6MRM**	**A**	**318,990**	**498**	**310**
*DK7ZH	*	221,387	363	269
*DL1SDJ	*	204,918	371	238
*DL8SDC	*	143,620	303	215
*DL3KDC	*	139,825	275	235
*DL7UXG	*	133,518	327	238
*DL8SUB	*	122,385	302	205
*DL1TS	*	109,792	247	188
*DL3ZAI	*	108,200	281	200
*DJ2UB	*	107,115	256	193
*DL3BRA	*	86,970	260	195
*DL2NEQ	*	41,943	146	123
*DL5ZB	*	39,852	141	108
*DH4PH	*	31,600	132	100
*DJ3GE	*	22,968	108	88
*DL3HSC	*	20,313	134	111
*DL2MIH	*	16,356	90	87
*DL7UHD	*	13,260	95	78
*DK8XA	*	6,954	69	57
*DL1ASF	*	6,496	59	56
*DL6NDQ	*	5,936	71	53
*DL2ZAV	*	4,224	52	44
***DK3DM**	**21**	**294,512**	**405**	**316**
*DL6AKK	*	10,266	66	59
*DJØBX	*	2,752	32	32

SPAIN

EA3GHQ	**A**	**2,934,926**	**1731**	**694**
EA3NY	**A**	**2,352,944**	**1753**	**638**
				(Op: EA3FUM)
EA4ST	**A**	**1,175,559**	**1204**	**539**

Say You Saw It In CQ

EA3CJ	*	1,027,488	1114	528
EA5DCL	*	1,010,615	988	535
EA3AR	*	862,960	851	460
EA4BAS	*	502,360	599	380
EA3ASS	*	484,822	592	377
EA3BCP	*	451,717	535	329
EA5AL	*	316,824	363	258
EA1NK	*	281,624	579	329
EA1RCT	*	279,784	525	328
ED1FY	*	258,830	472	286
EA1JO	*	240,210	410	306
EA7CWA	*	30,550	135	130
EA4AQT	*	7,095	60	55
EA3QP	**21**	**794,316**	**820**	**444**
EA2IA	*	552,483	643	391
EA3BHB	**14**	**929,500**	**1000**	**500**
EA5EQL	*	18,603	129	117
EA3AML	**7**	**145,140**	**292**	**205**
EA3ALV	**3.7**	**128,576**	**264**	**196**
EA3ELM	*	78,546	201	159
***EA7GTF**	**A**	**1,440,448**	**1241**	**568**
***EA3ELZ**	**A**	**1,041,310**	**13**	**505**
***EA3GEG**	**A**	**1,025,100**	**959**	**510**
*EA3BKI	*	1,005,934	956	482
*EA1BLX	*	828,836	817	436
*EA5ARC	*	659,190	702	438
*EA7RU	*	490,317	601	353
*EA1BLI	*	443,072	565	368
*EA1EB	*	413,160	540	330
*EA4DXP	*	335,964	500	332
*EC3AGC	*	335,331	605	333
*EA5EOR	*	234,379	430	289
*EA2BNU	*	210,627	368	269
*EA1ET	*	208,539	399	261
*EA5ASF	*	198,168	400	276
*EA1CJH	*	179,118	301	279
*EA3ASX	*	175,436	323	244
*EA3AM	*	170,909	301	277
*EA1AAA	*	162,250	300	250
*EA1BXM	*	151,200	295	225
*EA7EWX	*	127,065	302	215
*EA7ALO	*	113,291	233	193
*EA5AVD	*	110,090	356	218
*EA1BXK	*	101,000	261	202
*EA1AAW	*	93,632	230	209
*EA5CMQ	*	69,716	200	173
*EC5AEB	*	60,588	196	162
*EA5JC	*	43,757	150	133
*EA1BZN	*	42,545	144	127
*EA1GL	*	37,674	154	138
*EA1AUT	*	37,664	128	112
*EA1BZP	*	29,151	143	123
*EA3FAJ	*	27,360	130	114
*EA7HCU	*	26,923	115	109
*EC4DJY	*	25,623	144	117
*EA1BAW	*	25,410	137	121
*EC3ADZ	*	22,892	123	97
*EA5AJX	*	19,320	109	105
*EA5AFH	*	15,904	85	71
*EC1AKU	*	14,432	94	88
*EC4ANR	*	12,831	116	91
*EA5CRU	*	9,234	66	57
*EA1DFZ	*	4,524	40	39
*EA7TG	*	4,095	51	45
*EA1CIL	*	2,135	36	35
*EA7AGW	*	1,656	27	23
*EA5DIT	*	954	21	18
***EA3FCQ**	**28**	**85,484**	**224**	**142**
***EA7AKJ**	**28**	**48,384**	**162**	**108**
*EA7ASZ	*	38,400	145	100
*EA3AHS	*	5,920	55	37
***ED1JJ**	**21**	**1,280,241**	**1220**	**531**
***ED7FTR**	**21**	**985,545**	**1160**	**495**
***EA3GJH**	**21**	**420,717**	**526**	**363**
*EA7ANM	*	366,300	638	333
*EA1ACP	*	184,920	338	276
*EA5WX	*	154,224	317	216
*EC3AJW	*	148,180	379	239
*EA1EA	*	132,250	317	230
*EC5AHC	*	113,625	370	225
*EC7ACV	*	59,285	218	167
*EC1DMQ	*	48,300	245	161
*EC4DKJ	*	38,252	173	131
*EA5DPF	*	36,811	142	131
*EC1BXI	*	23,868	140	108
*EC7DNE	*	21,504	125	112
*EC3AJQ	*	17,836	105	91
*EC4AGQ	*	12,750	92	85
*EA4CIE	*	9,380	70	70
*EC4AMM	*	8,352	71	71
*EC3AME	*	7,626	69	62
*EC4AIV	*	4,863	59	53
*EC1ASY	*	4,508	50	46
*EA1AUM	*	3,978	74	51
*EC7DYH	*	3,036	46	44
*EC1CHX	*	1,287	33	33
***EA1AJV**	**14**	**633,539**	**847**	**449**
*EA3DVJ	*	26,875	138	125
*EA2CMF	*	2,168	32	31
*EA5TN	*	1,850	40	37
***EA7BDL**	**7**	**2,730**	**35**	**35**
***EA1DVY**	**1.8**	**6,426**	**59**	**51**
*EA5YB	*	576	18	18

BALEARIC ISLANDS

EA6LP	**A**	**535,670**	**659**	**391**
***EA6YW**	**A**	**171,756**	**316**	**234**
*EA6ACB	*	83,694	220	174
*EC6PG	*	71,968	230	173
***EA6EA**	**28**	**3,058**	**35**	**31**
***EA6JN**	**21**	**13,858**	**95**	**82**

IRELAND

***EJ/EA3BOX**	**A**	**957,006**	**1203**	**474**
***EI8GP**	**14**	**133,422**	**300**	**222**

ESTONIA

ES1RA	**14**	**14,320**	**111**	**80**
***ES6RHT**	**A**	**30,302**	**137**	**109**
*ES5RIM	*	13,038	152	141
***ES6RHB**	**21**	**17,304**	**87**	**84**
*ES5AAV	*	8,568	86	63
***ES4BG**	**3.7**	**107,338**	**260**	**187**

BYELORUSSIA

EW6AF	**A**	**273,585**	**502**	**299**
EW2AA	*	87,373	225	169
EU6DX	**21**	**602,225**	**687**	**425**
EW6AL	**7**	**2,418**	**31**	**31**
***EW1NY**	**A**	**278,4**	**493**	**290**
*EW4AB	*	189,588	402	244
***EU1SA**	**21**	**31,584**	**143**	**96**
*EU4AA	*	20,559	100	89
***EW5P**	**14**	**62,008**	**245**	**184**
		(Op: EU6FF)		

FRANCE

F5RZJ	**A**	**2,338,155**	**1462**	**669**
F5AMH	**A**	**807,930**	**878**	**423**
F5BBD	*	729,353	788	437
F5AOV	*	681,975	723	433
F2AR	*	389,942	560	346
F6FYD	*	258,068	385	298
F6KAW	*	169,290	282	198
F6ASS	**28**	**18,348**	**101**	**66**
F6HMQ	**21**	**2,103,742**	**1405**	**577**
TMØK	*	468,600	626	348
F2EE	**14**	**2,886,720**	**1808**	**744**
F6IFR	**14**	**1,379,124**	**1158**	**522**
		(Op: F6GWV)		
***F5ASD**	**A**	**562,590**	**714**	**399**
***F5BMK**	**A**	**356,728**	**530**	**344**
***F5OIH**	**A**	**353,280**	**475**	**320**
*F2RO	*	331,596	464	302
*F8BCZ	*	274,392	415	296
*F6FTB	*	212,382	365	243
*F6FNA	*	206,658	373	267
*F5POJ	*	176,653	330	241
*F5JBF	*	125,326	299	223
*F5NBK	*	107,940	260	210
*F5JGA	*	79,325	199	167
*F6FUN	*	76,152	200	167
*F6ACD	*	67,064	210	166
*F5TRB	*	14,280	96	84
***F5CWU**	**28**	**45,671**	**163**	**109**
***FB1CMF**	**28**	**41,100**	**153**	**100**
*F5NLY	*	27,710	120	85
*FB1BJI	*	24,651	111	83
*FB1UAW	*	10,812	74	53
***F5SHQ**	**21**	**6,580**	**50**	**47**

ENGLAND

G3SEM	**A**	**1,966,855**	**1455**	**605**
G4BUO	**21**	**6,804**	**54**	**42**
***G3VAO**	**A**	**229,080**	**409**	**276**
***GØAEV**	**28**	**120,109**	**299**	**179**
*G4IDL	*	29,410	129	85
*GØDEZ	*	96	6	6

NORTHERN IRELAND

GIØKOW	**A**	**10,563,579**	**38801017**	

GUERNSEY

MJØAWR	**A**	**1,732,812**	**1387**	**591**
		(Op: K2WR)		

SCOTLAND

GM3BCL	**A**	**422,092**	**572**	**362**
GM8V	**21**	**1,043,284**	**953**	**524**
		(Op: GM4YXI)		

WALES

GW8J	**A**	**2,133,780**	**1654**	**671**
		(Op: GW8GEI)		

HUNGARY

HA2SX	**A**	**3,114,791**	**1919**	**731**
HA8JV	**A**	**2,718,863**	**1863**	**673**
HAØIT	*	1,272,796	1097	524
HA8ZO	*	182,250	316	225
HA9RE	**7**	**1,834,860**	**1158**	**530**
HG6V	**3.7**	**708,372**	**801**	**378**
		(Op: HA6GK)		
***HA6NL**	**A**	**675,945**	**741**	**405**
*HA5CXC	*	94,801	254	203
***HA3FT**	**28**	**8,413**	**61**	**47**
***HA3GN**	**21**	**38,528**	**154**	**112**
***HA5BSW**	**7**	**726,680**	**682**	**370**
*HA4YO	*	53,098	170	139
*HA9MDN	*	34,200	136	114
***HA3LN**	**3.7**	**411,190**	**690**	**305**

SWITZERLAND

HB9AAA	**A**	**817,190**	**665**	**418**

ITALY

IR2W	**A**	**7,116,858**	**2842**	**882**
			(Op: I2VXJ)	
IQ7A	A	2,028,160	1531	640
IR4B	A	1,668,488	1254	584
			(Op: IK4AUY)	
IK6JNH	*	1,225,728	754	399
IK8UND	*	1,114,942	974	502
IQ2Q	*	1,054,163	1007	517
IN3XUG	*	378,840	497	328
IK6GPZ	*	362,232	469	312
II6T	*	326,080	455	320
			(Op: I6AIP)	
I4CSP	*	151,986	263	219
IK5YJK	*	77,064	231	169
IK3PQG	*	74,898	219	171
IZ3CDH	*	4,995	53	45
IV3BMV	**28**	**71,690**	**218**	**134**
IR6F	**21**	**2,174,175**	**1334**	**675**
			(Op: IK6BOB)	
IR4R	**14**	**1,654,848**	**1310**	**612**
			(Op: IK4ALM)	
IK1SLE	**14**	**953,516**	**1023**	**508**
II3R	*	869,376	895	512
II2Y	*	371,962	573	358
			(Op: IK2OWX)	
IK6CAC	*	362,531	676	353
IK8AFN	*	165,718	421	266
IK4GNK	*	247	19	13
IR8J	**3.7**	**156,832**	**341**	**208**
IR1A	**1.8**	**111,540**	**302**	**195**
***IK4QJM**	**A**	**290,444**	**432**	**308**
***IO4I**	**A**	**290,088**	**460**	**306**
			(Op: IK4QIB)	
***IKØWHN**	**A**	**225,450**	**383**	**270**
*IQØA	*	199,689	362	257
			(Op: IKØXBX)	
*IK3OII	*	176,852	315	247
*IOØKHP	*	158,426	301	226
*IK2PZC	*	153,340	283	220
*IK7RVY	*	152,490	310	221
*IIØC	*	61,248	190	176
*IK2RPK	*	51,830	175	146
*IK8IFW	*	40,764	156	129
*IV3KSE	*	9,856	75	64
*IZ2ABN	*	3,072	34	32
***IK2YSA**	**28**	**62,976**	**202**	**123**
***IC8JAH**	**21**	**190,890**	**318**	**202**
*IK4YNR	*	24,415	117	95
*IK3SCB	*	2,686	37	34
***II3T**	**14**	**2,369,408**	**1562**	**692**
			(Op: IV3TAN)	
*IU3V	*	162,846	447	249
			(Op: N7OV)	
*IR3T	*	47,724	219	164
			(Op: IV3AJZ)	
***IR7S**	**7**	**335,420**	**502**	**310**
			(Op: IK7YUA)	
*IV3RCH	*	80,676	256	162
***IO5A**	**3.7**	**169,796**	**329**	**227**
*IK3SSJ	*	143,658	330	207

SARDINIA

ISØNHT	**21**	**1,753,793**	**1305**	**613**

SICILY

IT9JOF	**A**	**1,125,470**	**937**	**482**
***IT9STX**	**14**	**2,403,722**	**1848**	**662**

NORWAY

LA6WEA	**A**	**776,324**	**1000**	**421**
LA4GIA	**21**	**22,140**	**90**	**82**
LA9HW	**14**	**2,695,982**	**1770**	**734**
LA8W	**14**	**1,427,976**	**1306**	**594**
LA2MJA	*	220,968	577	297
***LA2HFA**	**A**	**316,080**	**366**	**240**
***LA8ZJA**	**A**	**131,118**	**261**	**246**
*LA7CL	*	112,136	288	214
*LA1PHA	*	84,088	249	184
*LA5JX	*	27,610	135	110
*LA1K/P	*	20,300	144	116
			(Op: LA5NJA)	
*LA9PJA	*	11,659	105	89

LITHUANIA

LY1DS	**A**	**4,284,720**	**2320**	**792**
LY5W	**A**	**2,927,655**	**1859**	**731**
LY3BH	**A**	**2,118,161**	**1400**	**617**
LY3KB	*	637,140	751	410
LY2BN	*	349,830	511	345
LY2IJ	*	122,960	304	212
LY2BBF	*	14,240	98	80
LY2KM	**28**	**5,076**	**50**	**36**
LY3BA	**14**	**2,426,610**	**1760**	**705**
LY1DT	*	618,871	787	443
LY3ZM	*	1,333	33	31
LY3BX	**7**	**727,902**	**867**	**371**
LY3MM	**3.7**	**471,040**	**643**	**320**
LY2DX	*	177,514	362	227
LY2HN	*	143,318	328	203
LY6K	**1.8**	**481,164**	**740**	**303**
***LY2TZ**	**A**	**418,482**	**620**	**347**
***LY2FN**	**A**	**256,940**	**445**	**290**
*LY2AE	*	139,004	315	236
*LY2HK	*	133,123	355	239
*LY3CW	*	55,676	168	124
*LY3BCY	*	6,496	60	56
***LY2BTA**	**14**	**411,840**	**654**	**390**
*LY1DD	*	254,380	482	322
***LY3NJM**	**3.7**	**60,152**	**204**	**146**
***LY2OU**	**1.8**	**76,504**	**253**	**146**

BULGARIA

LZ5QZ	**A**	**1,157,889**	**1184**	**519**
LZ1BJ	**A**	**863,054**	**951**	**454**
LZ1DFP	*	44,550	154	135
LZ1QZ	*	2,905	37	35
LZ1GU	**28**	**65,240**	**172**	**140**
LZ8A	**21**	**1,099,861**	**990**	**497**
			(Op: Yanko)	
***LZ2GS**	**28**	**45,313**	**145**	**113**

AUSTRIA

OE1EMS	**A**	**2,898,368**	**1691**	**716**
OE2BZL	*	361,767	511	321
OE9MON	**21**	**1,831,308**	**1262**	**564**

FINLAND

OH6OS	**A**	**2,730,890**	**1835**	**694**
OH3WW	**A**	**2,642,730**	**1601**	**685**
OH6NIO	**A**	**2,534,000**	**1584**	**700**
OH3RM	*	1,353,996	1115	567
OH3MMH	*	862,790	855	478
OH3JR	*	445,474	576	361
OH8BQT	*	326,230	457	323
OH1RX	*	130,232	291	223
OH2VZ	*	123,400	250	200
OH4MCV	*	70,224	201	168
OH2BR	*	43,279	139	113
OH1AB	*	2,923	38	37
OH1AF	**21**	**2,020,275**	**1374**	**615**
			(Op: OH1NOA)	
OH3BU	*	312,624	472	312
OH1JD	**14**	**3,619,954**	**2013**	**754**
OH8AA	**14**	**3,446,540**	**2036**	**778**
			(Op: OH8MCT)	
OH1MA	**14**	**3,323,460**	**2210**	**772**
OH5NQ	*	973,865	1015	515
			(Op: OH5JOC)	
***OH4JFN**	**A**	**1,200,573**	**1039**	**543**
***OH7NJL**	**A**	**275,884**	**486**	**334**
*OH1MM	*	183,552	384	256
*OH5NE	*	85,164	236	188
*OH2LYP	*	54,288	191	156
*OH3JKV	*	39,370	137	127
*OH3IR	*	32,696	169	134
*OH2RL	*	6,844	60	58
***OH4YT**	**21**	**56,280**	**170**	**140**
*OH5PA	*	15,958	80	79
***OH6RC**	**14**	**60,610**	**205**	**190**
***OH4KBC**	**7**	**323,536**	**461**	**292**

CZECH REPUBLIC

OK1RI	**A**	**7,867,396**	**3162**	**911**
OK1EP	**A**	**1,174,932**	**1013**	**516**
OK2EQ	*	325,617	489	311
OK2XTE	*	62,828	162	139
OK1XW	**28**	**132,728**	**300**	**188**
OK1AVY	*	11,040	80	48
OK2ABU	**21**	**47,744**	**161**	**128**
OK1DVK	*	5,980	65	65
OK1FJD	**14**	**548,964**	**692**	**442**
OK1IE	**7**	**244,520**	**346**	**248**
OK2RZ	**3.7**	**1,304,670**	**1117**	**471**
OL4U	**3.7**	**1,042,272**	**1101**	**423**
OK1FC	*	281,600	434	275
***OK2VWB**	**A**	**1,083,314**	**839**	**494**
***OK1BA**	**A**	**434,896**	**570**	**353**
*OK1KZ	*	325,523	526	293
*OK1DKS	*	270,928	440	287
*OK2PCN	*	135,034	284	214
*OK1DSZ	*	130,592	301	212
*OK1DOL	*	124,232	312	212
*OK1AOU	*	67,423	202	153
*OK2SWD	*	63,585	230	157
*OK2BPK	*	21,681	104	99
*OK1DZ	*	18,318	104	86
*OK2PBG	*	18,260	100	83
*OK2KVI	*	6,552	64	56
*OK2BHE	*	2,263	33	31
*OK2BDI	*	702	13	13
***OK2PCL**	**28**	**25,632**	**120**	**72**
***OK1ARI**	**21**	**266,724**	**402**	**279**
*OK2SAT	*	265,392	400	304
*OK2PTZ	*	61,410	193	138
*OK1SI	*	28,222	117	103
***OK2PLK**	**3.7**	**48,600**	**150**	**135**

SLOVAKIA

OM3IAG	**A**	**975,792**	**883**	**464**
OM3EA	**A**	**455,885**	**588**	**365**
OM6TX	*	91,134	275	183
OM2TW	**3.7**	**1,008,716**	**1034**	**421**
OM1ZL	*	62,976	157	128
***OM4DN**	**A**	**395,416**	**609**	**322**
***OM3YK**	**A**	**304,288**	**484**	**296**
*OM3KXR	*	215,628	400	302
*OM6DM	*	97,305	267	195
*OM4KK	*	58,636	187	137
*OM3CDZ	*	52,440	182	138
*OM3TA	*	28,980	125	115
*OM7YC	*	17,255	96	85
***OM1II**	**28**	**5,610**	**57**	**34**
***OM7PY**	**21**	**60,030**	**170**	**145**
***OM3KTR**	**14**	**21,460**	**151**	**116**

BELGIUM

OT8R	**A**	**753,324**	**735**	**439**
			(Op: ON4AYL)	
ON5LL	**21**	**195,426**	**350**	**231**
ON5ØNOL	**1.8**	**45,500**	**172**	**125**
***ON4CAS**	**A**	**526,848**	**582**	**384**
***ON6CR**	**A**	**348,400**	**502**	**325**
*ON4XG	*	289,920	462	302
*ON5II	*	248,024	421	301
*ON4CU	*	119,952	223	204
*ON4CAN	*	87,300	200	180
*ON5CZ	*	4,263	54	29
***ON7NQ**	**21**	**827,520**	**717**	**431**

DENMARK

OZ5EV	**A**	**765,846**	**659**	**471**
OZ1INN	**21**	**34,500**	**131**	**100**
OZ3ZK	**7**	**9,720**	**69**	**60**
OZ3SK	**1.8**	**283,920**	**513**	**260**
***OZ8NJ**	**A**	**337,371**	**541**	**321**
***OZ1ACB**	**A**	**296,262**	**482**	**302**
*OZ5ABD	*	199,880	386	263
*OZ5EDR	*	126,474	297	214
*OZ7AEI	*	86,089	267	197
*OZ4NA	*	73,692	218	178
*OZ6TL	*	37,905	157	133
*OZ8AE	*	7,952	61	56
*OZ4FF	*	2,838	33	33

THE NETHERLANDS

PA3GCV	**A**	**520,114**	**640**	**383**
PAØCOR	*	41,846	151	122
PAØIJM	**14**	**734,660**	**893**	**436**
PAØMIR	**3.7**	**136,686**	**280**	**209**
***PAØKHS**	**A**	**727,181**	**775**	**427**
***PBØANR**	**A**	**201,750**	**337**	**250**
*PAØKDM	*	2,070	350	247
*PAØJR	*	168,226	325	233
*PA3GAB	*	144,540	297	220
*PAØRBS	*	32,745	127	111
*PAØJED	*	16,643	96	89
*PA3GZC	*	11,880	75	72
*PA3AAV	*	10,647	70	63
*PA3GFH	*	2,232	38	36
***PA3DMH**	**14**	**12,690**	**107**	**90**
***PA2SWL**	**3.7**	**291,500**	**489**	**275**
*PA3BWD	*	21,054	98	87

SLOVENIA

S56MM	**A**	**8,674,899**	**3092**	**921**
			(Op: S5ØA)	
S59ZA	**A**	**5,115,555**	**2233**	**765**
S57AW	**A**	**3,810,447**	**1970**	**747**
S55A	*	1,176,000	1025	525
S53O	**28**	**242,740**	**438**	**265**
S53R	**21**	**2,664,540**	**1602**	**655**
S58AM	**21**	**2,039,340**	**1301**	**615**
S5ØR	*	1,987,164	1290	612
S51A	*	1,095,368	902	509
			(Op: S57MW)	
S53FO	*	415,712	503	352
S58D	**14**	**1,950,000**	**1441**	**625**
S59L	**7**	**508,870**	**572**	**337**
S57O	**3.7**	**1,226,224**	**988**	**443**
S54E	**1.8**	**294,560**	**545**	**271**
***S57DX**	**A**	**2,125,614**	**1415**	**633**
***S53EA**	**A**	**2,006,250**	**1380**	**625**
***S57J**	**A**	**1,514,896**	**1050**	**584**
*S51F	*	1,296,777	1058	514
*S57XX	*	233,244	407	279
*S51MM	*	183,040	356	260
***S52OT**	**28**	**212,115**	**385**	**237**
*S51W	*	198,606	405	237
***S51WA**	**21**	**133,800**	**281**	**223**
***S53DX**	**14**	**41,013**	**190**	**147**
*S57U	*	4,280	50	20
***S5ØQ**	**3.7**	**602,580**	**738**	**363**
***S57CBS**	**3.7**	**276,040**	**441**	**238**
*S57KAA	*	258,990	455	267
*S57IIO	*	256,520	477	265
*S57MSU	*	104,512	255	184
*S57CQ	*	97,918	270	173
*S53XX	*	59,616	182	144

SWEDEN

SM7BJW	**A**	**158,166**	**203**	**202**
SM3AF	*	20,790	132	110
SM6FJY	**28**	**1,700**	**28**	**23**

SMØKV	21	17,094	154	111
SL3ZV	14	3,927,300	2432	780
		(Op: SM3JLA)		
*SM4AIO	A	360,168	561	349
*SM2KAL	"	29,997	137	99
*SM5OK	"	29,430	120	109
*SM6NJK	14	31,960	152	136
*SMØFM	"	3,570	52	51
*SM6AHU	"	3,290	70	47
*SK4UW	3.7	17,400	144	116
		(Op: SM4JHK)		

POLAND

SP6IXF	A	1,615,364	1104	566
SP9QMP	A	1,436,721	1247	561
SP4Z	A	1,116,710	912	490
SP6CZ	"	658,048	673	424
SP7FDV	"	251,440	409	280
SP1MHV	"	1,598	203	179
SQ1EIX	"	80,136	206	168
SPØDKI	"	41,168	156	124
		(Op: SP2DKI)		
SP9VRY	"	20,999	100	83
SP9LAS	"	20,007	93	81
SP3VAU	"	5,456	59	31
SP2JMR	28	46,870	167	109
SP6AOI	"	24,642	124	74
SP5GRM	21	2,152,438	1338	629
SP5BB	"	64,386	186	147
SQ8AMI	"	9,617	77	59
SP2FAX	14	4,446,900	2253	810
SP9W	14	1,007,500	1000	500
		(Op: SP9HWN)		
SP5IVC	"	101,223	257	207
SP2AVE	"	49,400	185	152
SP9MAT	"	48,240	175	144
SP9MAX	"	243	9	9
SP5VYI	7	172,824	309	228
SP3GTS	"	23,474	103	97
SP3KFH	3.7	915,768	960	414
SP7MTF	"	86,688	250	172
SP7GIQ	1.8	362,648	578	286
*SP1AEN	A	320,355	466	315
*SP7A	A	194,967	331	261
*SP6FBD	A	180,605	309	205
*SP3XR	"	100,084	268	191
*SP8OON	"	75,684	250	159
*SP9XWD	"	66,220	208	154
*SQ1BVG	"	55,107	204	157
*SQ9DXN	"	43,952	165	134
*SP9IKN	"	25,696	120	88
*SP9EMI/P	"	22,896	108	107
*SP6FJ	"	18,944	90	74
*SP9RPW	"	16,684	93	86
*SP9KJU	"	16,150	90	85
*SP9WUM	"	9,880	65	65
*SP3BHI	"	9,487	92	53
*SP7LHX	"	4,865	111	69
*SP6OPE	"	555	15	15
*SP9YFM	28	4,600	41	40
*SQ8GBN	"	1,552	34	16
*SP9BBH	21	307,320	426	312
*SP6V	"	68,796	187	147
		(Op: SP6DVP)		
*SP9HQC	"	6,068	66	41
*SP6KEP	14	571,090	702	382
*SP8HXN	"	33,536	163	128
*SP2AHD	"	24,320	141	128
*SP4SHD	"	11,550	80	66
*SP7RFF	"	1,992	70	24
*SP9XUE	"	1,350	31	30
*SP9CCA	"	430	19	10
*SP9DNO	7	5,828	92	31
*SP8LZC/8	3.7	26,260	134	101
*SP4AAZ	"	5,292	54	49
*SP4SAF	1.8	3,042	43	39

GREECE

SVØLM	A	356,184	509	306
J41TEN	28	75,361	212	143
		(Op: SV1DNW)		
SVØAN	21	152,456	443	236
*J41DKL	A	611,157	810	411
		(Op: SV1DKL)		
*SV1DZB	A	227,650	480	290
*SV1/UYØMF	"	142,245	265	261
*SV2AEL	28	19,800	105	72
*SV7CLI	21	49,704	228	152
*SV2YC	"	4,251	43	39
*J42Z	14	1,099,336	1474	536
		(Op: SV2CWY)		

DODECANESE

SV5TH	A	1,703,196	2240	561

BOSNIA

*T94LW	A	244,956	444	274
*T93Y	14	425,856	738	284
*T94DO	7	153,224	310	214

TURKEY (EUROPEAN)

*TA3BN	A	1,680,265	1182	437
*TA1BM	"	224,573	335	247

CORSICA

TK5NN	21	4,054,900	2117	820

EUROPEAN RUSSIA

RA3AUU	A	3,281,556	2003	732
RK3DH	A	1,501,464	1263	584
UA4LU	A	1,346,240	1120	560
UA1OMX	"	1,146,863	1064	557
RK4WWA	"	994,560	1016	480
		(Op: UA4WA)		
RA1AA	"	689,310	798	414
RX3AW	"	309,900	426	300
RU3DX	"	170,800	329	244
RV1CC	"	113,204	252	182
UA6AN	"	84,597	207	163
UA3XBB	"	61,506	151	134
RK3AD	"	37,290	155	113
RV3AH	"	16,830	100	90
UA4WAD	21	501,072	636	286
RW4HHA	"	185,712	400	219
RW1ZA	14	2,704,037	1771	733
UA3BL	14	699,906	903	471
RV3ACA	"	471,240	740	396
RW1ZN	"	130,424	301	238
RA3THN	"	12,838	115	98
RW3DU	7	315,000	273	210
UA1OMZ	"	121,572	267	198
RW6AH	"	47,530	272	194
RA4CC	3.7	224,982	373	261
RA1OJ	"	89,604	225	171
RK3SWX	1.8	168,480	260	180
RA4NW	1.8	105,878	247	634
UA1AFZ	"	62,624	208	152
*RA3WA	A	1,014,783	1000	483
*RX6AY	A	500,415	719	365
*RU4WE	"	379,618	604	347
*UA4HTT	"	353,916	535	339
*UA3LHL	"	172,190	360	257
*U1BA	"	135,470	369	230
*RW3GU	"	128,128	280	208
*UA4HAK	"	107,272	300	212
*UA1OIZ	"	45,756	146	124
*UA4ASE	"	36,875	173	125
*RU3DG	"	36,395	220	145
*RW3DA	"	35,301	145	123
*RU3FF	"	31,320	142	120
*RU3DD	"	30,870	150	126
*RV3LZ	"	16,830	100	85
*UA4LCQ	21	1,732,154	1367	577
*RA6LW	"	398,772	619	342
*RK3DT	"	97,658	246	193
*RK3XWD	"	14,720	105	80
*UA1AQF	"	2,952	112	36
*RA1AW	14	235,004	485	308
*RW4HFH	"	123,375	322	235
*UA4LBK	"	54,964	225	182
*UA3QNL	"	34,350	155	150
*UA4LDP	"	12,382	93	82
*UA1OMS	3.7	3,200	33	32

UKRAINE

EM4U	A	4,497,392	2461	824
		(Op: UT4UZ)		
EO3U	A	1,135,440	1170	498
UT3IZZ	"	898,570	727	590
EM8I	"	857,364	990	444
		(Op: UT8IM)		
UR5U	"	457,014	610	354
		(Op: UR5UW)		
UX5UO	"	144,324	278	211
UT2IY	28	203,148	372	228
UT5UGR	"	83,125	226	175
UX1UA	"	59,040	179	123
EN5E	21	1,638,204	1268	633
UT7DX	21	1,406,464	1114	512
UXØMM	"	920,924	949	467
UY5ZZ	14	1,545,438	1405	614
UT5UDX	"	263,307	531	303
UR6MW	"	89,870	300	209
UT7MD	"	59,096	200	178
UT5HP	"	55,930	187	170
EM7Q	"	22,848	124	112
		(Op: UR5QN)		
UR5LCV	7	741,488	703	383
UX7MM	"	499,120	653	340
US2IZ	3.7	351,600	533	300
UR8V	"	276,612	440	267
		(Op: UX2VZ)		
UR4QF	"	101,380	232	185
UX2MM	"	16,444	102	87
*UT4UO	A	2,629,458	1498	661
*UT4TA	A	179,080	354	242
*URØHA	"	166,941	365	243
*UT7EF	"	151,074	315	231
*UY5TE	"	128,785	339	215
*UT1UA	"	127,920	265	205
*UX5EF	"	69,806	232	167
*UR5WHT	"	65,920	222	160
*UU9JQ	"	48,202	190	154
*UT5UML	"	37,530	171	139
*UT1EJ	"	27,474	125	114
*UT8IT	"	19,584	113	102
*US5EVD	"	15,075	93	75
*UT5URW	28	9,234	64	57
*UR8QR	21	517,724	672	373
*UR5XAJ	"	50,959	190	131
*UR5EQU	"	9,009	73	63
*UT5UGQ	"	126	7	6
*UU7JX	14	798,310	982	485
*UR7UL	"	28,884	138	116
*UR5MAW	"	4,838	64	59
*UT1T	7	450,216	617	333
		(Op: UR7TZ)		
*UX3M	"	163,072	323	208
		(Op: UR3MP)		
*UR4UCM	"	30,240	125	105
*UX3MO	3.7	341,496	517	279
*UT1MW	1.8	9,576	74	63

LATVIA

YL7A	A	2,457,378	1773	693
YL8M	A	2,392,515	1626	673
		(Op: YL2KL)		
YL2KO	21	152,551	327	217
YL2GN	7	416,634	558	314
*YL2SW	A	87,168	265	192
*YL3FW	14	228,468	316	241

ROMANIA

YO5BRZ	A	1,068,500	1003	500
YO7ARY	28	103,824	302	206
YO3APJ	"	43,672	143	106
YR9P	14	439,930	757	370
		(Op: YO9HP)		
YO4AYE	"	33,880	163	140
YO2LIF	3.7	348,418	552	287
*YO5CYG	A	544,500	700	363
*YO8FR	A	439,302	623	347
*YO6BGT	"	77,096	200	184
*YO9IAB	"	58,188	204	156
*YO6BHN	"	49,536	150	128
*YO4US	"	39,560	148	115
*YO9XC	"	16,779	140	51
*YO5CMW	"	7,434	82	63
*YO5ODU	28	28,512	120	81
*YO4SLL	"	13,623	62	57
*YO5OCZ	"	9,504	62	54
*YR2R	21	413,076	539	348
		(Op: YO2DFA)		
*YO8WW	"	305,660	514	310
*YO3FRI	"	271,690	442	269
*YO9AHX	14	6,958	86	63
*YO5PAP	3.7	122,850	306	195

YUGOSLAVIA

YT1AD	A	5,134,374	2310	846
4N9BW	A	4,633,910	2418	841
		(Op: YU7BW)		
YU1OL	28	197,775	354	225
4N9AT	21	1,875,120	1295	601
YTØA	21	1,657,164	1173	591
		(Op: YZ6X)		
YT7A	"	1,320,747	1023	551
4NØAV	14	2,244,320	1646	676
		(Op: YU7AV)		
YT1BB	14	1,791,608	1625	598
YU7NU	7	2,169,144	1142	564
YU7AU	1.8	100,464	258	182
*YU1BO	A	170,500	358	250
*YT1DZ	"	154,936	294	214
*YU7SF	"	37,629	150	111
*4N7TA	"	26,696	110	94
*YU1CV	28	302,470	443	298
*YU1OJ	28	136,320	290	192
*YU7AL	"	70,966	208	137
*YU7GW	"	63,756	189	126
*4N7TW	"	50,511	165	113
*YU7KM	21	26,433	131	99
*4N7B	14	1,938,145	1543	655
*YZ1V	7	182,360	326	235
		(Op: Zika)		
*4N1A	3.7	434,098	614	307
		(Op: YT1WA)		
*YU1AST	1.8	20,520	112	95
		(Op: YZ1MI)		

MACEDONIA

*Z38X	A	2,669,238	1930	671
		(Op: NO6X)		
*Z32KV	28	8,234	61	46

OCEANIA

SAMOA

*5W1PC	A	72,900	208	135

THE PHILIPPINES

DU1SSR	A	1,769,047	1347	457
DU1FZB	"	184,549	368	179
DU1ODD	28	10,153	80	71
4F1GNW	21	66,124	197	122
4F3GDX	14	1,881,240	1247	514
DU1SAN	"	879,140	776	389
*4F4IX	21	2,840,255	1743	565
*DU3RCM	"	1,671,125	1250	461

NEW CALEDONIA

*TX88K	A	1,551,918	1273	426
		(Op: FK8HVN)		
*FK8GM	7	634,800	491	230

SOLOMAN IS.

H44RY	A	10,687,177	4379	817
		(Op: OH1RY)		

GUAM

*N2NL/KH2	A	1,033,396	997	334
*KH2/JE1SLP	"	546,399	756	177

HAWAII

NH7A	A	9,601,537	3519	761
NH7C	21	423,936	531	276
KH6T	14	2,681,684	1818	502
*KB6JOX/KH6	A	208,954	398	191
*KH6GMP	"	79,002	198	133
*NH7CC	28	196,182	402	173

AMERICAN SAMOA

KH8/N5OLS	21	5,936,783	2868	719

MARSHALL ISLANDS

V73UX	A	267,430	374	235

BRUNEI

V8JA	A	10,932,760	4463	712
		(Op: JH7PKU)		

AUSTRALIA

VK3TZ	A	2,650,582	1413	571
VK2ARJ	A	1,847,912	1311	484
VK1FF	A	129,404	256	187
VK8AV	A	23,594	100	94
VK3IO	"	20,088	84	81
VK1PJ	28	1,039,344	1021	354
VK2APK	14	1,332,072	908	504
*VK4NM	A	1,580,065	1120	493
*VK4SSB	"	1,090,890	946	391
*VK4EJ	"	648,768	718	327
*VK2VM	A	307,530	417	255
*VK5KMI	A	8,100	58	50
*VK4MOJ	21	3,096	43	42

INDONESIA

*YB2CPO	A	422,500	540	260
*YB4JIM	"	181,280	305	220
*YC8VIP	"	123,317	417	127
*YC8NLF	"	58,636	260	107
*YC3CVZ	28	75	5	5
*YB2LAB	21	467,262	522	306
*YB2ERL	"	136,675	283	175

NEW ZEALAND

ZL2DX	A	1,441,212	1000	498
ZL1ANJ	28	583,002	681	294

SOUTH AMERICA

CHILE

XQ8ABF	A	9,368,768	3494	872
CE8SFG	28	2,177,021	1426	539
CE8EIO	7	711,022	432	299
*CE6DFY	21	340,816	441	272

BOLIVIA

CP6UA	A	1,365,720	1073	456

URUGUAY

CX7BY	A	3,083,339	1602	679
CW8C	28	4,590,150	2309	710
		(Op: CX8CP)		
CV4Y	28	3,605,910	1991	669
CX7BF	"	59,085	171	117
CV8D	21	1,435,995	1018	495
		(Op: CX8AT)		
*CX3DAT	A	358,848	454	288
*CX2ABC	"	168,589	303	211
*CX5BE	28	268,732	390	254
*CX9BAG	28	228,718	345	238

ECUADOR

*HC6CR	21	3,630,900	1900	650

COLOMBIA

HK4QIM	21	1,342,847	960	473
*HK3LT	A	292,824	400	249
*HK3SGP	"	184,275	319	195

ARGENTINA

L77E	A	2,445,404	1377	533
		(Op: LU4DXU)		
LW1DX	A	430,400	511	320
LU5VV	"	186,702	222	222
LUØHØXX	"	87,156	217	162
LU6ETB	28	7,391,769	3008	847
LWØD	28	4,036,496	2059	688
		(Op: LU7DW)		
LU3HY	28	3,906,662	2051	662
LU5MM	"	3,458,470	1894	634
LU2FA	"	2,995,520	1762	592
LU1MA	"	2,707,371	1602	591
LU7HBO	"	421,036	503	308
LU2DW	21	2,681,280	1470	630
LU2NI	14	5,169,342	2211	797
LT5V	7	122,388	172	141
*LU8HLI	A	3,899,520	1897	720
*LU5EVK	"	78,585	202	155
*LU1AEE	"	29,232	100	87
*LU9HS	28	3,886,400	1962	694
*LU5FC	28	3,218,180	1765	635
*LU4VZ	28	2,937,990	1697	614
*LU4FCZ	"	2,160,270	1347	567
*LU7HH	"	1,856,148	1251	532
*LU7HN	"	1,620,012	1126	508
*AY5E	"	1,403,115	1043	483
		(Op: LU5EWO)		
*LU2EC	"	1,353,938	1010	482
*LW7EIC	"	1,246,696	954	457
*LU5HCI	"	1,081,938	911	429
*LU3HL	"	828,380	763	388
*LU1FMO	"	816,881	751	403
*LU5HA	"	811,314	711	411
*LU6AMD	"	541,080	569	360
*LU7DR	"	366,126	481	278
*LW7EGO	"	366,036	461	282
*LU7FEU	"	140,600	261	190
*LU3OJZ	"	87,531	206	163
*LU5DSE	"	4,038	45	42
*LQ4I	14	2,088,423	1217	621
		(Op: LU4IC)		
*LU4HKN	"	1,430	27	26
*LU8FDZ	7	21,252	66	66

PERU

OA4EI	A	1,807,300	1212	550

ARUBA

P4ØN	A	16,903,166	5251	982
		(Op: KW8N)		
P43T	A	5,677,320	2829	660
P49M	28	1,432,287	1316	387
		(Op: VE3MR)		
P43P	21	6,339,615	2708	789
*P43E	A	2,546,892	1626	526
*P43DJ	21	4,236,138	1958	711

BRAZIL

ZX5J	A	14,768,160	46211056	
		(Op: PP5JR)		
PT7BZ	A	7,502,558	2876	826
PY5HOT	A	4,713,457	2198	749
PT2TF	"	590,634	604	342
PT2HF	"	272,384	367	266
PT2ADM	"	44,604	161	118
PY4OY	28	3,799,250	2044	650
PP5UB	28	2,750,202	1623	598
PY3RK	28	1,015,056	1014	477
ZV2VT	"	381,440	500	298
PU2PSZ	"	158,598	297	198
PU2MZI	"	140,928	285	192
PY2EDY	"	140,060	277	188
PY2TI	"	13,328	79	68
PS8NF	"	910	37	26
PQ5W	7	213,928	228	187
*PP2RON	A	715,580	753	370
*PY2APQ	A	405,120	444	320
*PY2DJ	"	279,256	412	268
*PY2OZF	"	245,673	395	243
*PY2QW	"	216,240	352	255
*PY2KQ	"	182,608	321	226
*PY1WAS	"	9,628	64	58
*PS8ET	"	9,500	100	95
*PY5ADC	"	4,840	63	44
*PU2RUX	28	2,817,488	1685	586
*PY2MNL	28	1,648,952	1179	488
*ZW5W	28	1,579,836	1084	519
		(Op: PP5WN)		
*PY2XE	"	1,579,320	1142	492
*PY1KB	"	1,466,520	1065	484
*PY2NW	"	762,496	738	368
*PY5HSD	"	734,920	700	380
*PU2PXR	"	660,114	678	338
*ZY2WEJ	"	624,361	658	349
*PU2MRY	"	523,260	593	342
*PY2ELG	"	85,860	235	162
*PY2GY	"	55,572	183	132
*PY5BF	"	52,959	162	127
*PY2KTT	"	47,250	176	125
*PU2UIB	"	35,200	145	110
*PY2EJN	"	7,426	95	79
*PY5AG	"	4,480	41	40
*PU2AXE	"	3,825	58	45
*PP5UA	21	2,404,650	1424	615
*PR2W	"	142,683	270	199
*PY2IQ	"	118,560	237	190
*PY2NY	14	49,278	151	129
*PY5AWB	"	98	7	7

VENEZUELA

YW5A	A	6,346,690	2783	710
		(Op: YV5AMH)		
YV5NKV	"	557,655	562	339
YV6DBW	28	552,552	670	299
YW1A	14	4,731,350	2220	725
		(Op: YV1AVO)		

Say You Saw It In CQ

These are three of the operators at TS5I. On the tower are IK5JAN and IK5BTW, with I5JHW on the roof.

YV6DBX	**3.7**	**421,032**	**344**	**212**
YV2IF	**1.8**	**17,248**	**60**	**49**
***4M5E**	**A**	**2,841,393**	**1626**	**631**
		(Op: YV5NWG)		
*YV7QP	*	10,258	65	46
***YY1HFY**	**28**	**792**	**32**	**22**
***YW3B**	**21**	**224,120**	**439**	**260**
		(Op: YV3BKC)		
***YV5DZQ**	**7**	**86,346**	**123**	**117**

PARAGUAY

ZP2EHA	**A**	**657,000**	**650**	**365**
ZPØM	**28**	**5,462,250**	**2597**	**750**
		(Op: ZP5XF)		
ZP5MAL	**21**	**1,179,633**	**915**	**447**
ZPØZ	**14**	**2,481,240**	**1471**	**580**

TRIBANDER/SINGLE ELEMENT

UNITED STATES

W9IW	**A**	**2,739,464**	**1685**	**689**
		(Op: ES2RR)		
AD1C	**A**	**2,667,271**	**1390**	**619**
AI2C	**A**	**2,375,753**	**1519**	**601**
K6ZX/8	**A**	**2,171,402**	**1424**	**622**
N6ED	**A**	**2,116,988**	**1480**	**628**
W6TK	*	1,764,788	1222	566
W1CU	*	1,668,108	1108	578
KI6CG	*	1,504,230	1296	546
KMØL	**A**	**1,340,408**	**1105**	**548**
KGØZI	*	1,322,838	1360	561
K6BZ	*	1,251,488	1156	592
WC1M	*	1,225,150	994	535
WA4TTI	*	1,096,983	829	467
KC6X	*	1,094,512	1077	536
KE8GG	*	1,025,545	858	463
ND5S	*	805,396	700	454
W1TE	*	727,301	700	379
NI2P	**A**	**631,182**	**624**	**354**
WY9L	*	606,871	648	373
AG4W	*	605,183	653	367
KN6Z	*	542,260	621	380
N9LCR	*	518,742	653	379
KC5AK	**A**	**226,160**	**341**	**220**
N2CU	*	200,010	316	226
K2FR	*	180,557	300	221
N6VH	*	169,644	312	201
WT8P	*	145,318	300	226
K4BAI	*	123,464	258	184
W7QN	*	121,905	280	215
AE4RO	*	44,577	153	127
N2CK	*	32,214	133	118

DX

H44RY	**A**	**10,687,177**	**4379**	**817**
		(Op: OH1RY)		
XQ8ABF	**A**	**9,368,768**	**3494**	**872**
3DA5A	**A**	**8,423,856**	**3253**	**822**
		(Op: JM1CAX)		
EA9AM	**A**	**6,864,416**	**2864**	**754**
		(Op: AI6V)		
4N9BW	**A**	**4,633,910**	**2418**	**841**
		(Op: YU7BW)		
EM4U	**A**	**4,497,392**	**2461**	**824**
		(Op: UT4UZ)		
LY1DS	**A**	**4,284,720**	**2320**	**792**

S57AW	**A**	**3,810,447**	**1970**	**747**
HA2SX	**A**	**3,114,791**	**1919**	**731**
CX7BY	**A**	**3,083,339**	**1602**	**679**
EA3GHQ	**A**	**2,934,926**	**1731**	**694**
LY5W	*	2,927,655	1859	731
OE1EMS	**A**	**2,898,368**	**1691**	**716**
VK3TZ	**A**	**2,650,582**	**1413**	**571**
DK9DA	**A**	**2,566,635**	**1536**	**695**
NL7Z	**A**	**2,383,260**	**1659**	**506**
DK2OY	*	2,367,675	1557	619
GW8J	**A**	**2,133,780**	**1654**	**671**
		(Op: GWØGEI)		
VY2LI	**A**	**2,109,888**	**1333**	**576**
KL1V	*	2,098,978	1607	479
IQ7A	**A**	**2,028,160**	**1531**	**640**
JA1YNE	**A**	**1,973,272**	**1273**	**569**
G3SEM	**A**	**1,966,855**	**1455**	**605**
OA4EI	**A**	**1,807,300**	**1212**	**550**
DU1SSR	**A**	**1,769,047**	**1347**	**457**
MJØAWR	**A**	**1,732,812**	**1387**	**591**
		(Op: K2WR)		
IR4B	*	1,668,488	1254	584
		(Op: IK4AUY)		
S55A	*	1,176,000	1025	525
OK1EP	**A**	**1,174,932**	**1013**	**516**
IK8UND	*	1,114,942	974	502
IQ2Q	*	1,054,163	1007	517
EA5DCL	*	1,010,615	988	535
EA3AR	*	862,960	851	460
OH3MMH	**A**	**862,790**	**855**	**478**
EA7DHP	*	681,453	911	423
RA9JW	**A**	**626,773**	**621**	**391**
EA6LP	**A**	**535,670**	**659**	**391**
EA4BAS	*	502,360	599	380
EA3BCP	*	451,717	535	329
UN8RA	**A**	**411,822**	**480**	**274**
LU5VV	**A**	**186,702**	**222**	**222**
OH2VZ	*	123,400	250	200
IK3PQG	*	74,898	219	171
IZ3CDH	*	4,995	53	45
EA3QP	**21**	**794,316**	**820**	**444**
NH7C	**21**	**423,936**	**531**	**276**
OH3BU	**21**	**312,624**	**472**	**312**
LA8W	**14**	**1,427,976**	**1306**	**594**

LOW POWER

UNITED STATES

WD5K	**A**	**1,363,672**	**1000**	**542**
W2GG	**A**	**1,145,767**	**827**	**469**
WN6K	**A**	**990,756**	**896**	**438**
NA2Q	**A**	**861,670**	**755**	**433**
KG2AU	*	634,005	624	365
WS7V	**A**	**508,691**	**578**	**391**
KAØWWT	**A**	**312,684**	**461**	**284**
WA5IYX	*	228,846	403	258
KG5NE	*	183,416	307	227
N8YYS	**A**	**126,666**	**252**	**186**
KD6DAE	*	123,648	300	192
KB3AGZ	*	99,640	227	188
W4YE	**A**	**53,802**	**160**	**126**
KK5CA	*	16,182	101	87
WB4DNL	*	9,765	71	63
N7RQ	**21**	**124,976**	**274**	**214**
NN5Z	**14**	**139,815**	**297**	**239**

DX

LU8HLI	**A**	**3,899,520**	**1897**	**720**
3B8/DL6UAA	**A**	**3,486,288**	**1974**	**592**
4M5E	**A**	**2,841,393**	**1626**	**631**
		(Op: YV5NWG)		
UAØSJ	**A**	**1,840,608**	**1415**	**581**
TX88K	**A**	**1,551,918**	**1273**	**426**
		(Op: FK8HVN)		
S51F	**A**	**1,296,777**	**1058**	**514**
JA7NVF	**A**	**1,204,082**	**956**	**458**
EA3ELZ	**A**	**1,041,310**	**1003**	**505**
RAØFF	*	1,032,190	900	466
EA3GEG	*	1,025,100	959	510
OK2VWB	**A**	**1,003,314**	**839**	**494**
EA8BXQ	**A**	**927,990**	**800**	**378**
VE3WIB	**A**	**873,892**	**741**	**394**
EA1BLX	*	828,836	817	436
VE3STT	*	650,430	616	365
KH2/JE1SLP	**A**	**546,399**	**756**	**177**
EA7RU	*	490,317	601	353
LU3HKA	*	431,624	482	326
EA1EB	*	413,160	540	330
F2RO	**A**	**331,596**	**464**	**302**
JF1RWZ	*	301,080	407	260
IO4I	**A**	**290,088**	**460**	**306**
		(Op: IK4QIB)		
PY2DJ	**A**	**279,256**	**412**	**268**
JH1UUT	*	275,082	423	254
VE2SAI	**A**	**254,535**	**370**	**239**
ON5II	**A**	**248,024**	**421**	**301**
JE1UFF	*	212,440	360	226
EA2BNU	*	210,627	368	269
EA1ET	*	208,539	399	261
DL1SDJ	**A**	**204,918**	**371**	**238**
XE2SOZ	**A**	**201,756**	**441**	**204**
PBØANR	**A**	**201,750**	**337**	**250**
EA5ASF	*	198,168	400	276
S51MM	*	183,040	356	260
PY2KQ	*	182,608	321	226

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EZNEC ("Easy-NEC") captures the power of the NEC-2 calculating engine while offering the same friendly, easy-to-use operation that made ELNEC famous. **EZNEC** lets you analyze nearly any kind of antenna - including quads, long Yagis, and antennas within inches of the ground - *in its actual operating environment*. Press a key and see its pattern. Another, its gain, beamwidth, and front/back ratio. See the SWR, feedpoint impedance, a 3-D view of the antenna, and much, much more. With 500 segment capability, you can model extremely complex antennas and their surroundings. Includes true current source and transmission line models. Requires 80386 or higher **with coprocessor**, 486DX, or Pentium; 2Mb available extended RAM; and EGA/VGA/SVGA graphics.

ELNEC is a MININEC-based program with nearly all the features of EZNEC except transmission line models and a limitation of about 127 segments (6-8 total wavelengths of wire). Not recommended for quads, long Yagis, or antennas with horizontal wires lower than 0.2 wavelength; excellent results with other types. Runs on any PC-compatible with 640k RAM; CGA/EGA/VGA/Hercules graphics. Specify coprocessor or non-coprocessor type.

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EA1CJH	*	179,118	301	279
IK3OII	*	176,852	315	247
EA3ASX	*	175,436	323	244
JK2VOC	*	175,119	317	217
JG1TVK	*	173,020	295	211
UA3LHL	**A**	**172,190**	**360**	**257**
EA6YW	**A**	**171,756**	**316**	**234**
EA3AM	*	170,909	301	277
EA1BXM	*	151,200	295	225
PA3GAB	*	144,540	297	220
LY2AE	*	139,004	315	236
EA7EWX	*	127,065	302	215
EA7ALO	*	113,291	233	193
JR1MRG	*	108,072	362	158
VE3SRE	*	101,576	232	206
EA1BXK	*	101,000	261	202
EA1AAW	*	93,632	230	209
JA2OJ	*	89,436	199	514
EA6AC8	*	83,694	220	174
CT98ELF	**A**	**81,600**	**230**	**160**
JL2HUJ	*	79,124	220	151
F6FUN	*	76,152	200	167
EA8BGO	*	55,304	154	124
JH7IPR/6	*	44,958	154	118
JA9EJG	*	40,414	137	121
EA1GL	*	37,674	154	138
PAØRBS	*	32,745	127	111
EA1BZP	*	29,151	143	123
LA5JX	**A**	**27,610**	**135**	**110**
EA7HCU	*	26,923	115	109
EA1BAW	*	25,410	137	121
LA1K/P	*	20,300	144	116
		(Op: LA5NJA)		
EA5AJX	*	19,320	109	105
PAØJED	*	16,643	96	89
EA5AFH	*	15,904	85	71
EA5CRU	*	9,234	66	57
EA7TG	*	4,095	51	45
EA1CIL	*	2,135	36	35
EA5DIT	*	954	21	18
JAØRYN/7	**28**	**28,301**	**127**	**91**

BAND RESTRICTED

***JA5EO**	**A**	**430,155**	**480**	**363**
***EC3AGC**	**A**	**335,331**	**605**	**333**
***EC6PG**	**A**	**71,968**	**230**	**173**
*EC5AEB	*	60,588	196	162
***OH3JKV**	**A**	**39,370**	**137**	**127**
*EC4DJY	*	25,623	144	117
*EC3ADZ	*	22,892	123	97
*EC1AKU	*	14,432	94	88
***LY3BCY**	**A**	**6,496**	**60**	**56**
***NH7CC**	**28**	**196,182**	**402**	**173**
***FB1CMF**	**28**	**41,100**	**153**	**100**
***KB4OGM/T**	**28**	**39,858**	**154**	**91**
*FB1BJI	*	24,651	111	83
*FB1UAW	*	10,812	74	53
*KE4MVK/T	*	1,554	0	74
***EC5AHC**	**21**	**113,625**	**370**	**225**
***JA9SCB/1**	**21**	**49,140**	**160**	**135**
*EC1DMQ	*	48,300	245	161
*EC7DNE	*	21,504	125	112
*EC4AGQ	*	12,750	92	85
*EC3AME	*	7,626	69	62
*EC7DYH	*	3,036	46	44
*EC1CHX	*	1,287	33	33
***S57KAA**	**3.7**	**258,990**	**455**	**267**

ROOKIE

UNITED STATES

KU4HZ	**A**	**1,078,896**	**1041**	**494**
KB9MDL	**A**	**592,662**	**677**	**411**
AA1SU	**A**	**314,028**	**438**	**286**
***KE4ZQZ**	**A**	**238,032**	**407**	**261**
***KI8CS**	**A**	**188,163**	**320**	**207**
***N3XQP**	**A**	**169,404**	**329**	**228**
***KQ6ES**	**A**	**168,740**	**345**	**220**
***AB7RW**	**A**	**167,832**	**325**	**252**
***AB1BX**	**A**	**159,950**	**305**	**215**
***N9TU**	**A**	**122,740**	**278**	**190**
***N3YEA**	**A**	**52,924**	**153**	**131**
***N1YJD/Ø**	**A**	**26,334**	**137**	**114**
*KC8HPL	*	17,155	100	73
*K6MCP	*	6,912	69	54
***K6KAY/T**	**28**	**57,054**	**195**	**111**
*KF6GUH	*	29,281	154	89
***W8TTS**	**28**	**8,771**	**64**	**49**
***KC7KDZ/T**	**28**	**624**	**16**	**13**
***KIØJZ**	**21**	**4,860**	**26**	**25**

DX

***P43E**	**A**	**2,546,892**	**1626**	**526**
F5AOV	**A**	**681,975**	**723**	**433**
***F5BMK**	**A**	**356,728**	**530**	**344**
VE1TRH	**A**	**301,735**	**436**	**259**
*F8BCZ	*	274,392	415	296
***YT1DZ**	**A**	**154,936**	**294**	**214**
***LA8ZJA**	**A**	**131,118**	**261**	**246**
***PA3GZC**	**A**	**11,880**	**75**	**72**
***JK8FRL**	**A**	**3,864**	**44**	**42**
***PY2ELG**	**28**	**85,860**	**235**	**162**
***F5CWU**	**28**	**45,671**	**163**	**109**
***EA7ASZ**	**28**	**38,400**	**145**	**100**
*PU2VYT	*	22,098	103	87
***CT2GFQ**	**28**	**3,366**	**38**	**34**
P43P	**21**	**6,339,615**	**2708**	**789**
***EC7ACV**	**21**	**59,285**	**218**	**167**
*EC3AJQ	*	17,836	105	91
*EC4AMM	*	8,352	71	71
*EC4AIV	*	4,863	59	53
*EC1ASY	*	4,508	50	46
***UT5UGQ**	**21**	**126**	**7**	**6**

ASSISTED

UNITED STATES

KC6ETY	**A**	**2,711,520**	**1495**	**630**
NA2NA	*	2,018,520	1471	648
WØGJ	**A**	**1,609,920**	**1152**	**624**
W3BGN	**A**	**1,547,340**	**1038**	**492**
W4MYA	**A**	**1,412,014**	**926**	**458**
K4MA	*	1,408,750	1000	490
N5JR	**A**	**1,363,450**	**1009**	**550**
W1NG	**A**	**1,293,302**	**979**	**586**
K7ZUM	**A**	**1,196,069**	**1011**	**529**
W7OM	*	1,035,045	812	459
W2YR	*	851,942	719	434
N1NQD	*	668,304	579	364
N5IN	*	530,706	593	374
N6CCL	**A**	**369,242**	**454**	**349**
K3DI	*	212,205	290	235
N3ED	*	195,573	282	201
K3MD	*	181,650	308	210
N1SP	*	139,400	239	200
K2WB	*	137,114	236	179
K1MY	*	124,432	227	176
AD4G	*	50,479	214	143
W9GIG	**A**	**17,794**	**83**	**82**
KF2O	*	2,883	31	31
K2UT	**21**	**290,672**	**376**	**296**
K6III	**21**	**146,496**	**312**	**218**
W6OUL	*	20,336	97	82

DX

DLØWW	**A**	**4,826,142**	**2265**	**837**
		(Op: DK3GI)		
EA3KU	**A**	**4,578,060**	**2171**	**820**
JM4UQM	**A**	**3,370,950**	**1820**	**681**
DF6QV	*	2,885,740	1801	715
IN3ZNR	**A**	**2,809,190**	**1752**	**695**
IO4A	*	2,780,163	1654	673
		(Op: IK4PVR)		
GX4WSM	**A**	**2,349,896**	**1607**	**664**
EA5AEY	*	2,289,671	1589	703
OH9MM	**A**	**2,063,901**	**1683**	**609**
SMØDJZ	**A**	**1,685,430**	**1274**	**614**
SM5IMO	*	1,537,822	1101	566
DL5IC	*	1,488,775	1036	527
JR4QZH	*	1,289,680	953	470
OH3LQK	*	1,103,000	1004	500
HD2RG	**A**	**795,492**	**790**	**342**
OH5BM	*	761,442	743	417
EA7DHP	*	681,453	911	423
JG3KIV	*	164,905	280	215
JH4NMT	*	146,115	270	191
EA3BHK	*	70,707	167	147
S56M	**A**	**58,380**	**184**	**140**
IK6VXO	*	43,230	122	110
EA3EJI	**21**	**608,572**	**640**	**431**
JQ1NGT	**21**	**222,159**	**412**	**213**
F5BEG	**21**	**74,412**	**191**	**156**
TM7XX	**14**	**2,381,148**	**1637**	**693**
		(Op: F5MUX)		
DL3NED	**14**	**1,866,880**	**1342**	**640**
LY8X	**14**	**1,635,093**	**1402**	**621**
		(Op: LY1FF)		
UA9AR	**14**	**1,240,000**	**907**	**500**
S55T	**3.7**	**516,530**	**713**	**329**
S57M	**1.8**	**280,884**	**510**	**267**

LOW POWER

UNITED STATES

WW3S	**A**	**1,296,554**	**944**	**518**
W2GG	*	1,145,767	827	469
AJ4Y	**A**	**541,190**	**574**	**362**
W9RM	**A**	**270,540**	**400**	**270**
WA4QDM	*	255,760	353	230
W7CT	**A**	**15,640**	**76**	**68**
WR3L	**21**	**279,300**	**380**	**285**
W9HV	**21**	**162,426**	**275**	**214**

DX

YU1NR	**A**	**1,594,368**	**1348**	**576**
EA3CKX	**A**	**618,824**	**711**	**412**
9A4KA	**A**	**472,144**	**610**	**368**
7L4IOU	**A**	**431,766**	**531**	**306**
VE3ZZ	**A**	**360,961**	**469**	**289**
DL8NFU	**A**	**235,152**	**421**	**284**
EA5FWW	*	215,710	374	265
JK2VOC	*	175,119	317	217
OH2ME	**A**	**150,332**	**301**	**236**
F5GEG	**A**	**105,984**	**260**	**207**
T95A	**A**	**38,354**	**150**	**127**
DJ6TK	*	13,124	79	68
LU7HVN	**28**	**722,917**	**1580**	**597**
JL4CVG	**28**	**80,765**	**235**	**145**
LW1ECO	*	27,231	114	87
PU2VYT	**28**	**22,098**	**103**	**87**
JAØBMS/1	**21**	**169,510**	**279**	**230**
PP5JD	**14**	**1,314,010**	**972**	**505**
EA5YJ	**14**	**361,296**	**701**	**386**
YO2LDE	**14**	**17,640**	**121**	**98**
YZ7ED	**7**	**226,008**	**249**	**172**
YU1RA	**1.8**	**36,414**	**151**	**119**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

KI1G	**8,228,000**	**2996**	**880**
NE6N	**5,764,928**	**2819**	**832**
KT4W	**5,135,972**	**2339**	**799**
W7RM	**4,836,048**	**2266**	**778**
WO8CC	**4,448,520**	**2146**	**810**
K5TR	**4,227,678**	**2413**	**801**
N4TO	3,817,602	1951	786
KC7V	3,726,730	2413	801
NK7U	3,606,460	1791	715
NX5M	3,551,432	2424	797
NR6R	2,915,325	1784	675
AA5NT	2,631,808	1767	709
WA1RR	2,554,998	1675	677
KU4BP	2,433,699	1497	621
NA5B	2,401,074	1721	662
WV2LI	**2,361,996**	**1572**	**637**
KT6RA	2,002,692	1646	628
KF9YT	**1,966,356**	**1279**	**612**
KRØB	**1,724,806**	**1375**	**622**
K6ZM	1,581,825	1072	525
W4AN	1,139,544	878	456
NN6NN	1,082,199	1147	543
KT3T	**1,070,700**	**1110**	**498**
WR1X	1,021,470	830	474
AB2DE	757,800	661	421
N2JIX	606,696	587	408
WR6WR	588,929	685	407
W7IG	582,498	609	378
NY4T	479,115	588	351
KC1F	467,575	528	317
WEØF	398,780	488	314
N9THC	388,102	479	299
K1TO	346,192	465	308

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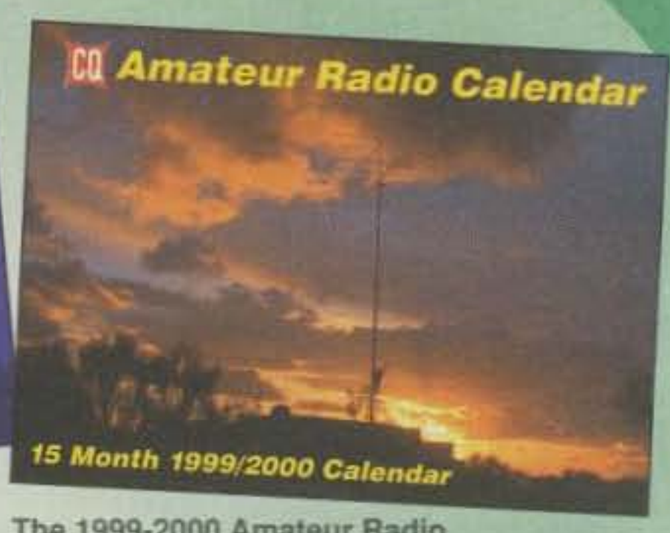

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4U1WB	283,584	685	336
WM2V	210,945	334	245
N9LYE	137,082	292	201
N8DXR	135,342	329	219
N3VIA	86,078	201	179

NORTH AMERICA

KL2A	**10,792,866**	**3898**	**939**
J8ØR	**8,158,326**	**3271**	**781**
NP3U	**6,444,065**	**2585**	**785**
VE7ZZZ	**4,325,832**	**2149**	**756**
VA3SK	**4,047,240**	**1844**	**696**
NP3P	2,503,284	2448	714
KP2/WJ8C	**2,237,640**	**1550**	**580**
VE3MIS	690,300	563	354
CO2BCC	**650,796**	**534**	**281**
VE2CMH	**338,295**	**444**	**285**

AFRICA

TS5I	**16,157,168**	**4519**	**929**
6V1C	**11,859,608**	**4418**	**899**
ED8CMT	**8,001,762**	**3248**	**762**

ASIA

UPØL	**10,021,968**	**3592**	**814**
A61AJ	**9,694,336**	**3815**	**848**
RK9CWW	**7,844,361**	**2827**	**833**
EX9A	7,442,204	3494	803
9K9K	**7,036,119**	**3116**	**751**
JA4EKO	**6,876,610**	**2768**	**845**
5B4ES	**6,243,536**	**2550**	**676**
JH7AFR	4,928,616	2208	762
JE6ZIH	4,174,090	1993	710
3W6WE	**3,222,324**	**2395**	**673**
JF1SQC	2,974,960	1638	656
RK9KWI	2,295,180	1338	615
VU2JNA	**1,423,356**	**1020**	**451**
RK9SWF	1,103,184	804	376
HS5AC	**1,096,713**	**1312**	**453**
JI2ZEY	984,280	862	440
RK9AZZ	854,645	695	379
DX1CW	**717,744**	**817**	**304**
DX1RN	400,492	597	236
DX1E	353,344	416	203
RK9JWZ	349,960	452	260
JN1YUU	2,184	35	28

EUROPE

TM1C	**12,703,590**	**4388**	**1035**
IR4T	**12,499,872**	**3948**	**1064**
HG1S	**12,476,200**	**4468**	**1070**
OG5F	**10,957,298**	**3915**	**1034**
TM2V	9,333,120	3484	960
9A7A	**9,202,390**	**3452**	**970**
M8T	**9,104,734**	**3600**	**989**
UD6M	**8,946,102**	**4050**	**979**
S58AB	**8,839,176**	**3252**	**956**
OHØW	**8,769,920**	**3805**	**965**
S53M	8,397,000	3096	900
OH5LF	8,378,880	3465	960
RM6A	8,323,679	3977	949
EN5J	**7,648,672**	**3586**	**958**
GW4BLE	**6,777,540**	**2779**	**815**
OM5M	**6,761,040**	**2904**	**880**
DK1NO	**6,559,761**	**2823**	**897**
RO3A	6,040,430	3323	890
OH7AAC	6,024,160	2980	920
LX6T	**5,872,384**	**2799**	**812**
ED3TR	**5,808,255**	**2667**	**885**
UT7Z	5,686,035	3007	843
RN4W	5,634,633	3115	867
M8X	5,584,384	2892	839
TM2T	5,174,780	2537	845
ES5Q	**4,624,992**	**2606**	**808**
OZ9KY	**4,520,892**	**2378**	**804**
OT8P	**4,419,655**	**2210**	**835**
II4T	4,340,900	2169	830
IO2A	4,308,150	2217	825
SKØUX	**4,162,656**	**2215**	**786**
DFØHTE	4,155,624	1580	636
SP6YAQ	**4,121,442**	**2119**	**741**
HB2CA	**4,031,384**	**2172**	**772**
TP4CE	4,012,120	2179	805
OM3Z	3,930,102	2156	759
OL5Q	**3,453,576**	**2061**	**732**
RK3AWE	3,442,692	2232	726
9A5D	3,359,328	2033	672
S59KW	3,236,137	2001	731
ED5WPX	3,210,039	1568	609
PI4CC	**3,202,426**	**1911**	**719**
OL5T	3,114,648	1868	724
4U1ITU	**3,007,424**	**1701**	**686**
CT7O	**2,919,028**	**2130**	**742**
G8A	2,888,640	1897	708
IQ9K	**2,818,900**	**1889**	**700**
Z39Z	**2,721,544**	**1849**	**644**
UT7L	2,649,991	1824	667
SP9PRO	1,970,865	1515	585
HB5OK	1,763,628	1579	564
HA/WØYR	1,761,460	1476	580
DL3KZA	1,739,736	1329	584
DLØBI	1,718,628	1361	591
LX4B	1,519,241	1250	577
IQ9A	1,450,757	1296	581
G4KNO	1,345,086	1155	513
IO2L	1,272,456	1029	548
LY2OM	**1,262,100**	**1080**	**525**
TMØE	1,207,310	1406	502
G8Q	1,201,176	1116	498
DLØER	1,199,898	1048	534
OZ7HAM	1,182,448	1100	526
DL7UZO	1,177,141	1093	499
DFØDFA	1,177,141	1093	499
LX2LX	1,173,590	1253	470
RZ1AWO	1,089,000	1090	495
RK6AYN	1,064,976	1074	528
RK4HYT	1,023,372	1341	558
9A7P	975,326	1036	473
M8J	965,797	1003	491
OK2KOD	887,427	876	453
EA1EEY	873,278	901	469
DLØRT	804,750	811	435
OM3KWZ	718,940	841	412
DLØSLZ	704,916	729	428
EA4BHO	684,255	1000	435
IQ7R	655,872	766	448
DLØTS	597,402	812	351
M8G	589,764	763	413
IK7YTT	557,600	715	400
TM2OO	375,524	500	349
EA5URL	307,008	498	328
SK6DG	223,287	381	283
OZ5L	216,212	391	283
UT4UWC	203,304	418	258
OE1W	202,419	388	243
EA4RKU	196,700	396	281
DFØBB	193,116	331	266
ED1DX	179,334	346	246
EA7BJV	167,942	368	262
M8U	129,163	375	227
F6KRK	125,670	312	213
SN6U	123,624	295	204
PI4EUR	65,688	200	161
OK1KCF	63,510	207	146
T91EZC	288	12	12

OCEANIA

AH2R	**11,164,400**	**4662**	**760**
VI6EWT	**3,109,776**	**1808**	**592**
P2ØX	**2,770,968**	**1854**	**526**
YE2B	**1,098,108**	**975**	**396**
YB3ZES	738,661	707	371
VK5GN	**324,736**	**377**	**236**

SOUTH AMERICA

ZW5B	**18,835,518**	**5445**	**1087**
LT1F	**13,735,669**	**4482**	**997**
LP4H	5,038,040	2250	760
LT5Y	4,528,350	2165	725
AY6D	4,466,910	2178	717
LU6FBI	4,007,575	1861	715
LU3VAL	3,676,728	1968	627
LU7DCE	833,976	748	396
PY3MHZ	142,107	272	201

MULTI-OPERATOR MULTI-TRANSMITTER

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KO6N	**12,166,398**	**4,759**	**1,038**
KU8E	**11,111,950**	**4,256**	**1,070**
KS3F	**9,299,288**	**3,660**	**1,028**
KB1H	**2,296,703**	**1,372**	**641**
AI4R	**2,296,188**	**1,833**	**684**
KG2M	**1,156,620**	**1,057**	**521**
N5KB	**383,500**	**499**	**325**

NORTH AMERICA

KP3P	**35,453,750**	**9,797**	**1,255**
VE6JY	**10,643,104**	**3,920**	**953**
VE6FI	7,058,520	2,928	840
VE5RI	**4,558,690**	**2,435**	**756**
T42R	**2,069,595**	**1,460**	**565**

ASIA

P3A	**41,053,560**	**9660**	**1,255**
JA6ZPR	**4,837,305**	**1,696**	**1,045**
JA1YPA	4,187,629	1,980	733
JH4WBY	348,810	463	302

EUROPE

OT8A	**25,763,088**	**8,150**	**1,272**
9A1A	**25,278,840**	**7,394**	**1,278**
EA4URE	**14,746,239**	**5,569**	**1,073**
RK2FWA	**12,036,925**	**4,799**	**1,031**
RZ3Q	**10,674,792**	**4,582**	**1,038**
LY7A	**9,679,509**	**4,386**	**987**
OHØ/DK6QW	**3,750,048**	**2,075**	**1,044**
ED7VG	3,296,625	2,296	745
ED4RAX	1,493,212	959	476
SK6NP	**1,324,468**	**1,194**	**526**
ED2RCA	1,222,950	1,212	526
TF3IRA	**1,119,822**	**1,187**	**627**
J43PTR	**1,082,500**	**1,104**	**500**
OK1OKE	**910,116**	**883**	**477**
OZ5W	**531,805**	**639**	**365**

OCEANIA

KH7R	**25,932,036**	**7,119**	**1,014**
VK4IU	**2,751,114**	**1,525**	**582**

SOUTH AMERICA

LU4FM	**20,375,872**	**5,832**	**1,124**
XQ3PA	**1,776,015**	**1,180**	**549**

CHECK LOGS

The following logs were used for cross-checking. SWL and check logs are always appreciated.

4Z5DW, 4Z5FC, 4Z5GV, 4Z5JX, CT1DJE, CT2GFQ, CT2GPT, CT98DJE, DJ9DZ, DL1DXX, DL1HSR, DL2AL, DL2AYL, DL3BYE, DL3HWM, DL4VBS, DL5DWW, DL6AXI, DL7VRG, EA1BHF, EA1EBJ, EA1EXJ, EA1FAE, EA1LT, EA1YM, EA2RW, EA3AYQ, EA3BSE, EA3FYD, EA3TA, EA4AFI, EA4BYJ, EA4CEN, EA4EOI, EA5AOM, EA5FJT, EA5GRO, EA5NT, EA5RJ, EA6GP, EA7GBD, EC2AHZ, EC5AIH, EC5CON, EC8AXG, ES6MO, EU2MM, EW8DA, F5BEN, F5FG, HA4XN, HKØOEP, HK7TNY, HLØZX, HL2AQN, IK8LPX, KD2KS, LA1FW, LA5RIA, LA5YV, LA9LO, LA9NM, LZ1RDX, LZ2DB, LZ2UZ, LZ3AB, LZ4TX, NØXCF, NA1O, OK1AVY, OK2NM, OK2PSA, OK5SWL, OK7DX, OM4JD, PAØRBA, PA3ASC, PA3HGF, PU2WDD, PU3WPA, PY2MYS, PY2RAF, PY3AJB, PY3AON, PY3CEM, PY3FBI, PY3KID, PY3NDB, PY3UEB, PY7BEL, RA9FF, RN3AM, RSØF, RU3AA, RW6AML, S57MCI, S58AL, SMØLZT, SM2IEO, SM3CBR, SP1GZT, SP1RWK, SP3BGL, SP3KVE, SP4AS, SP4DZT, SP4GFG, SP6NVK, SP7MOQ, SP7VCK, SP8FHM, SP8JMA, SP8KBZ, SP9AVZ, SP9CLO, SP9MDY, SP9MQH, SQ5HAR, SV1CID, T97M, UAØBGZ, UA3DK, UA3UBT, UA4AO, UA4OK, UA6BS, UA9OS, UR5TAM, UT4UP, UT5JCE, VA2CQ, VA3DYD, VE2GWL, VK4AJH, VK5OE, W1MGP, XR4B, XX9AU, YC8NLF, YO4ATW, YO5OFJ, YO6ODN, YO8DHD, YO8GF, YO8OH, YO9FZS/P.

DISQUALIFIED: PW2C and RN6BY for excessive unverifiable QSOs (Rule XV).

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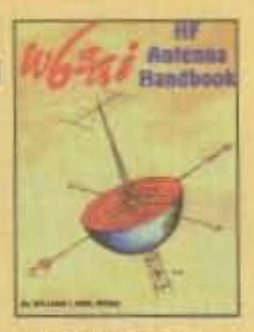

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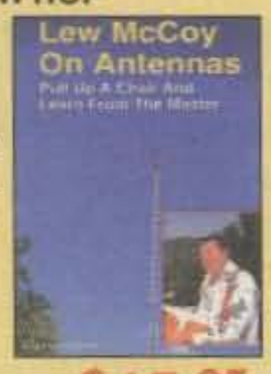

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Announcements *(from page 6)*

Midland, TX. Contact Midland ARC, P.O. Box 4401, Midland, TX 79704, or Larry Nix, N5TQU, by e-mail: <oilman@lx.net>; hamfest flyer and registration form at: <http://www.lx.net/edge>. (Exams)

Mar. 21, **Winter WECAFEST,** Yonkers Raceway, **Yonkers, NY**. Contact Tom Raffaelli, WB2NHC, 914-741-6606, or WECA web site at: <www.weca.org>. (Exams)

Mar. 21, **Southington ARA Fleamarket/ Hamfest,** Southington High School, **Southington, CT**. For information, send SASE SARA Hamfest, c/o Chet Bacon KA1LH, 138 1/2 Summit St., Plantsville, CT 06479-1125, 860-628-9346, e-mail: <hcbacon@connix.com>; web: <http://www.connix.com/~hcbacon/sara.html>. (Exams)

Mar. 21, **Hamfest & Computer Show,** Charleston Civic Center, **Charleston, West Virginia**. Call Jimmie Hewlett, WD8MKS, 304-768-1142, or e-mail: <crwhamfest@juno.com>.

Mar. 21, **Tri-County ARC Hamfest 1999,** Jefferson County Fairgrounds Activity Center, **Jefferson, WI**. Phone 920-563-6502 (eves); e-mail <tricountyarc@globaldialog.com>. (Exams)

Mar. 21, **Toledo Mobile Radio Assn. Hamfest/Computer Fair,** Lucas County Recreation Center, **Maumee, OH**. For more info, send SASE to Paul Hanslik, N8XDB, TMRA, P.O. Box 273, Toledo, OH 43697 (419- 243-3836).

Mar. 21, **Hamcomp '99 Hamfest,** Tall Cedars of Lebanon Picnic Grove, **Hamilton Twp, NJ**. More info call 609-882-2240, or <www.slac.com/w2zq>.

Mar. 27, **Columbus ARC Hamfest,** Bartholomew County 4H Fair Grounds, Community Building, **Columbus, OH**. Call 812-342-4670, or e-mail <winterbe@hsonline.net>.

Mar. 27, **Eastern Connecticut Fleamarket,** Pomfret Community School, **Pomfret, CT**. Call Paul Rollinson, KB1CNW, 860-928-2456; or e-mail to: <paulrollinson@worldnet.att.net>.

Mar. 27, **Michigan City Hamfest & Computer Fleamarket,** Michigan City High School, **Michigan City, IN.** Contact Ron Stahoviak, N9TPC, 219-325-9089.

Mar. 27, **RAS of Norwich Ham Radio Auction,** Waterford Senior Center, **Waterford, CT**. Contact Tony, AA1JN, 860-859-0162 or see the Radio Society of Norwich web page: <www.ims.uconn.edu/~rason>.

Mar. 28, **Lake County ARA Hamfest,** Madison High School, **Madison, OH**. Call Roxanne at 440-256-0320. (Exams)

Mar. 28, **Lake ARA Free Tailgate,** LARA Clubhouse, **Leesburg, FL**. Contact Paul Branch, K3NON, 352-343-8729, e-mail: <w8hfk@aol.com>.

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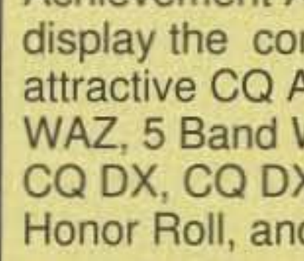
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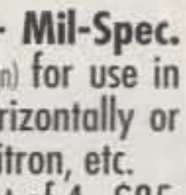

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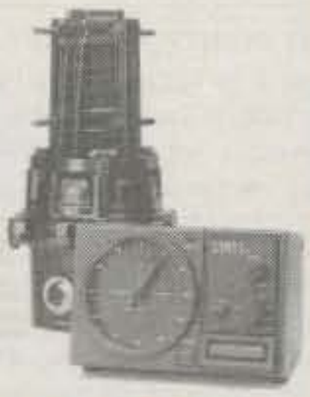

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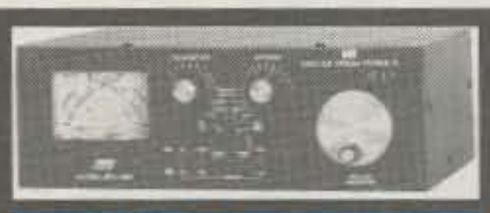

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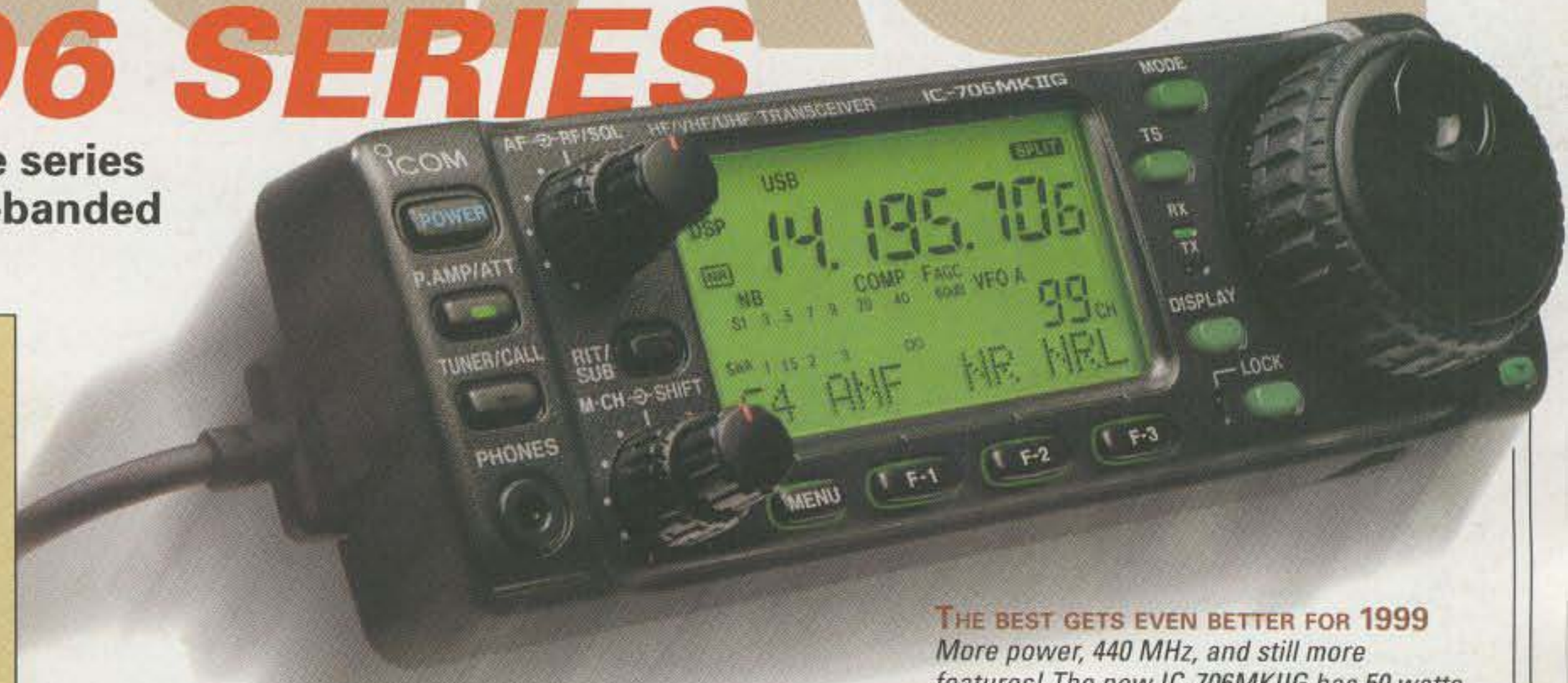

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